DISCLAIMER

The information included in this document is a consolidation of the EPA/CMA Root Cause Analysis Pilot Project survey responses and ideas that may help address some environmental issues identified in the survey responses. This document is intended to assist environmental managers, regulators, and other interested parties to better understand the causes of noncompliance and to consider recommendations and ideas that may help improve environmental compliance and performance. While the categories of noncompliance and root causes discussed in this report were developed by the project team, the characterization of particular noncompliance events in terms of those categories was based entirely on individual survey responses. It should be emphasized that EPA has neither reached any conclusions nor made any decisions in response to the findings, recommendations, or ideas for compliance assistance; or EPA policy, regulatory, or statutory changes included in this document. This document is not a substitute for complying with the regulations themselves. Neither CMA nor EPA makes any guarantees or assumes any liability with respect to use of any information, recommendations, or ideas contained in this document.

Acknowledgments

This document is the result of a partnership between the Chemical Manufacturers Association (CMA) and the Environmental Protection Agency (EPA). The background, experiences, and creativity of the following people were essential in developing this document.

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Through a peer-review process, the project team received and incorporated valuable comments into the report. We appreciate the time and effort of our peer reviewers.

Executive Summary

Purpose

The U.S. Environmental Protection Agency (EPA) and the regulated community continually seek effective and efficient methods of improving compliance with environmental regulations. From 1996 through 1998, EPA and the Chemical Manufacturers Association (CMA) worked together to pilot an approach for identifying and evaluating the root causes (that is, underlying causes) of noncompliance with regulatory requirements, to identify recommendations for improving compliance, and to provide insight into the effect of environmental management systems (EMS) on compliance. To obtain information from certain CMA member facilities, the project team developed a survey focused on the following four questions:

- What are the root causes of noncompliance?
- How do facilities respond to noncompliance events and what are the lessons learned?
- How have Responsible Care® and other management systems affected the overall environmental performance of facilities?
- What changes on the part of the facility or the Agency will improve compliance and the efficiency of the compliance process?

This report summarizes survey responses to questions regarding the root and contributing causes of noncompliance and makes recommendations, for industry and government, to improve compliance with environmental regulations. The report should be of value to the regulated community, state and federal regulators, and other persons interested in the challenge of promoting regulatory compliance.

A thorough examination of the causes of noncompliance is a valuable tool that can help improve compliance and minimize the occurrence of noncompliance. Any root cause analysis should focus on an exhaustive and diligent identification of all causes and the implementation of corrective measures that may yield long-term solutions.

Because of the limitations of the data on which this report is based (addressed in more detail on page 5) the results of this survey are representative only of large CMA member facilities in the project's study population. Beyond this study population, the project findings should be considered largely as a guide to further root cause research.

Types of Noncompliance

The four types of noncompliances identified most frequently by survey respondents, in order, are:

- Report Submissions and Reporting: Failure to submit required reports or the submittal of incomplete or inaccurate reports to the regulating agency
- Exceedance: Failure to meet discharge limit(s), as defined in the facility's permit or by regulation
- Operations and Maintenance: Noncompliance of an operations and maintenance nature
- Record Keeping: Failure to maintain operating records or files in accordance with regulations

Root Causes

Multiple causes were identified for 94 percent of the noncompliance events identified.

The six categories of root causes and the specific causes within each category identified most frequently, in order, are:

- ***Regulations and Permits*** *- facility unaware of applicability of a regulation*
- ***Human Error*** *- individual responsibility or professional judgment*
- ***Procedures*** *- operating procedure not followed*
- ***Equipment Problems*** *- design or installation*
- ***External Circumstances*** *- contracted services, such as haulers or handlers*
- ***Communications Difficulties*** *- between facility and regulatory agencies*

Contributing Causes

The four categories of contributing causes and the specific causes within each category identified most frequently, in order, are:

- ***Management*** *- environmental aspects of facility process and operations not identified*
- ***Procedures*** *- reporting or notification procedures unclear*
- ***Regulations and Permits*** *- contradictory interpretation of state or federal regulations*
- ***Compliance Monitoring*** *- audit program insufficient* and *routine site and equipment checks not conducted*

Responsible Care® and Other Environmental Management Systems

Survey responses indicate that there is a strong relationship between the implementation of Responsible Care® or other EMSs and compliance. However, even a complete, well documented EMS does not, by itself, ensure 100 percent compliance with environmental requirements. Survey responses also indicate that facilities are modifying or clarifying their EMSs to minimize the incidence of noncompliance events:

- The majority of responses identified environmental audit programs; corporate policies, goals, targets, and guidelines; and Responsible Care® as management methods that have a strong influence on environmental performance.
- Among the respondents, 78 percent had modified their EMSs in response to a noncompliance event.
- Among the respondents, 41 percent stated that Responsible Care® or another EMS would have contributed to prevention of the noncompliance event.
- The project team considers 71 percent of the actions taken in response to a noncompliance event relevant to an EMS.

Respondents' Perspectives on Improving Compliance

Respondents' perspectives on traditional and innovative approaches to improving compliance include:

- Respondents identified increased employee involvement, improvement of the facility's management system, more clearly defined commitment on the part of management, and improved understanding of regulations as the most effective actions industry could take to improve compliance.
- Respondents identified tools developed by the facility, facility employees and corporate staff, and trade associations as the most useful sources of compliance assistance, indicating the industry's historical reliance on in-house support.
- Respondents recommended that government work with industry to provide more technical assistance, including guidance, documents, self-audit check lists, logic or applicability flowcharts, and workshops—ideally for each new rule.
- Respondents recommended a range of policy and regulatory changes, including the development of "plain language" rules, pilot testing of new rules, consolidation of overlapping regulatory requirements, and reduction of record keeping and reporting requirements.
- Respondents suggested that self-audits, third-party audits, EMS audits, or other forms of self-monitoring, potentially coupled with penalty relief, be used as alternatives to traditional compliance inspections.
- Respondents suggested that EPA reduce the frequency of compliance inspections for facilities that have good compliance records.

Recommendations

Industry should consider the following actions to improve compliance:

- Ensure that all EMS elements are in place and all employees understand that the elements are part of the facility's EMS.
- Implement a program that promotes high levels of awareness of and commitment to the EMS among employees at all levels.
- Increase awareness among management and employees of the central role that a comprehensive EMS can play in achieving and maintaining compliance.
- Focus efforts on identifying more opportunities for rigorous implementation and evaluation of EMSs.
- Establish accurate, standard operating procedures that all affected employees can understand.
- Train employees to ensure that new and modified operating procedures are implemented properly.

EPA should consider the following actions to promote compliance with regulations:

- Articulate new regulations more clearly.
- Work with state agencies to ensure that regulations are interpreted consistently.
- Continue compliance assistance and outreach activities.
- Consider the development of compliance assistance tools, such as plain-English guides for every new rule.
- Provide more incentives for industry to disclose violations.

Individually, and working together, EPA and various industry sectors should pursue additional root cause analyses of noncompliance to better understand the findings and recommendations discussed in this report. Such analyses might focus on:

- Understanding why and in what situations violations occur at facilities with EMSs.
- Looking more carefully at the "human error" category of causes used in this report.
- Involving, at the design stage of the analysis, a statistician and social psychologist.
- Studying noncompliance at small (less than 100 employees) companies.
- Conducting more research through discussions between EPA and industry to more fully understand the relationship between particular violations and appropriate corrective actions.

Table of Contents

EPA/CMA Root Cause Analysis Pilot Project

Chapter 1

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) and industry share a vital interest in exploring new approaches for improving compliance with environmental laws, reducing risk of environmental harm, and raising awareness of environmental issues. One way to help improve compliance and environmental performance is to understand why there is difficulty complying with environmental laws—a question to which the answer is not obvious. In short, regulators and industry need to conduct root cause analyses. The goal of this root cause analysis project is to improve environmental performance by understanding (1) the causes of noncompliance and (2) the impact of environmental management systems (EMS) and the Chemical Manufacturers Association's (CMA) Responsible Care® initiative on compliance.

This report presents an overview of survey responses from industry representatives about the root and contributing causes of noncompliance events that were identified in federal civil judicial or administrative actions. It also offers suggestions for improving compliance by minimizing the occurrence of those causes. As a follow-up activity, input from EPA personnel involved with these federal judicial or administrative actions will be sought to obtain their perspective on the causes of the noncompliance events.

Any industry sector can use the findings and recommendations in this report in a variety of ways, depending on a facility's size and level of sophistication. For example, many suggestions in this report include activities related to EMSs. Facilities presently implementing an EMS can use the findings in this report to either reinforce the value of their existing EMS or to encourage further evaluation of the EMS. Facilities that do not have EMS experience can use the report as a guide regarding important EMS elements and implementation considerations. The information in this report can also be used by federal and state regulators to improve new and existing rules and to optimize their compliance assistance efforts. Working together, industry and regulators can use the findings of this project to fulfill environmental goals and objectives through a better understanding of the issues associated with regulatory compliance. Specifically, the findings and recommendations in this report may encourage industry and regulatory agencies to consider the following activities:

- Conduct additional root cause analyses
- Use future root cause analysis results to validate and refine the results of this report
- Modify environmental policy to incorporate changes based on the findings of root cause analyses
- Encourage the support of management to bring about behavioral changes among employees that will promote compliance
- Implement the recommendations discussed in Chapter 5 of this report

Creating the Partnership

EPA's Office of Enforcement and Compliance Assurance (OECA), CMA, and an ad hoc committee of CMA member companies created a partnership to achieve the project goals. The partnership between EPA and CMA represents the first time EPA and representatives of the regulated community have worked together to develop an understanding of the root causes of noncompliance and analyze recommendations for improving environmental performance. The partnership was documented in a Memorandum of Understanding that identified the terms and conditions of the partnership and established the project's framework. The parties called the effort the *EPA/CMA Root Cause Analysis Pilot Project*.

What is the Chemical Manufacturers Association?

CMA represents chemical manufacturers that have operations in the United States and internationally. Founded in 1872, CMA is one of the oldest manufacturing trade associations in the Western Hemisphere. CMA's member companies account for more than 90 percent of the productive capacity for basic industrial chemicals in the United States. Manufacturers of chemicals and allied products provide more than one million jobs for American workers and are the nation's leading exporters, with total exports in 1997 of $69.4 billion.

CMA brings together member company experts to help resolve industry wide policy, technical, and scientific problems. CMA communicates and works with government and the public on vital issues and administers research, studies, and tests on a wide range of chemical products and practices.

Why the Partnership?

To understand why noncompliance occurs and how facilities respond to noncompliance events, EPA recognized the need to work with industry. CMA represents a sophisticated industry that conducts a number of manufacturing processes that make the industry subject to most federal environmental statutes. The broad applicability of environmental regulations to the chemical industry provided the opportunity to identify and assess the causes of noncompliance with a wide range of regulatory programs. Working with CMA provided EPA the opportunity to understand the chemical industry's perspective on the causes of noncompliance with those statutes and the industry's recommendations for improving its environmental performance.

CMA participated in the project because it offered a unique opportunity to work jointly with EPA to discover the root causes of certain noncompliance events. CMA actively seeks partnerships with government to try to resolve the important environmental and compliance issues that confront both industry and government.

CMA was particularly intrigued by EPA's interest in the views of facility personnel about how and why past noncompliance events occurred and about ways in which compliance and regulations can be improved. That unique aspect of EPA's proposed project represented a departure from the less interactive approaches taken under similar government-sponsored projects.

The information gathered and the lessons learned in this project provide EPA, CMA, and other industry groups new opportunities to improve environmental compliance. EPA will be better able to further its regulatory reinvention and compliance assistance activities, and industry can incorporate the recommendations into daily operations to effect behavioral change. EPA and industry also can create environmental policy that better serves the needs of industry, government, and the public. EPA and CMA believe that these opportunities can be duplicated in future collaborative efforts, such as additional root cause analyses, to improve compliance and environmental performance.

Project Development

The project team developed a survey to gather information from facility personnel that respondents could complete with minimal burden. Once responses were received, EPA and CMA worked jointly to analyze them. Important project events are highlighted in the box below.

The Project Process

- Agreement on project goals and scope, August 1996
- Negotiation of a Memorandum of Understanding between EPA and CMA, December 1996
- Formulation of target questions and development of survey, January 1997
- Identification of candidates to receive the survey, January to March 1997
- Submittal of an information collection request (ICR) to the U.S. Office of Management and Budget (OMB) (ICR No. 1792.01, OMB Control No. 2020-0008), April 1997 and two Federal Register (F.R.) notices in compliance with the Paperwork Reduction Act, 44 U.S.C. § 3501 *et seq.* (61 F.R. 41605-41606 and 62 F.R. 27599-27600)
- Distribution of survey, October 1997
- Collection of responses, concluded in March 1998
- Review of responses, January to June 1998
- Assessment of representativeness of responses, October 1998
- Production of draft report, June 1998 to December1998
- Conduct peer review, January 1999 to March 1999
- Issuance of final report, May 1999

To preserve the anonymity of respondents, CMA distributed the survey and collected the responses.

Criteria for Selecting Recipients of the Survey

Survey recipients were CMA member facilities that had been parties to a federal civil judicial or administrative action that commenced and concluded between 1990 and 1995. Applying this criteria, 50 facilities that had been involved in 79 enforcement actions were identified. Of those facilities, 27 facilities involved in 47 enforcement actions voluntarily completed and returned the survey.

Application and Limitations of the Survey Responses

Fifty CMA facilities met the criteria established for the pilot project. Because these facilities were not randomly chosen, the findings of this project do not have broader application to larger populations with statistical validity. However, survey responses received from large (more than 100 employees) CMA member facilities within Standard Industrial Classification (SIC) code 2869 (Industrial Organic Chemicals, Not Elsewhere Classified) *were* sufficiently numerous to adequately represent all large CMA facilities in the study population. Additional limitations of the data set are discussed in Appendix A. More generally, the results of the survey can be viewed as an initial guide to some frequent causes of noncompliance, as identified by 27 facilities that were party to a total of 47 federal enforcement actions. These findings also can serve as an excellent guide for conducting additional root cause work to validate and refine the findings of this survey of root causes of noncompliance.

Structure of the Survey

To obtain information from certain CMA member facilities, the project team developed a survey focused on the following four theme questions:

- What are the root causes of noncompliance?
- How do facilities respond to noncompliance events, and what are the lessons learned?
- How have Responsible Care® and other management systems affected the overall environmental performance of facilities?
- What changes on the part of the facility or the Agency will improve compliance and the efficiency of the compliance process?

Generally, respondents were asked to:

- Categorize noncompliance events described in federal complaints or settlement documents
- Identify root and contributing causes of the noncompliance events
- Identify any actions taken in response to noncompliance events

- Identify how the facility verified that actions taken would promote compliance
- Describe any lessons learned from the noncompliance events and actions taken
- Describe the facility's EMS at the time of the noncompliance events and any changes made to the EMS since the noncompliance event to prevent its recurrence
- Provide their views about ways to improve compliance with regulatory requirements and identify compliance assistance tools and activities they need
- Provide their views about traditional and innovative compliance and enforcement activities

Appendix A presents the questions asked in the survey and quantifies the number of responses to each question. Appendix A also discusses the limitations of the survey.

Respondents characterized violation(s) identified in the complaint(s) or settlement document(s) as noncompliance event(s), according to 15 categories provided and the statute under which the noncompliance event occurred. The 15 noncompliance categories defined in the survey are listed below. Appendix B presents definitions of these categories.

Noncompliance Categories

- Corrective Action Activities
- Equipment/Unit Design
- Exceedance
- Failure to Respond
- Labeling
- Legal Agreement
- Monitoring/Dectection/Control
- Operations and Maintenance
- Record Keeping
- Report Submissions and Reporting
- Spills/Releases
- Testing
- Training/Certification
- Unpermitted/Unauthorized Activity
- Waste Identification

Survey respondents were provided the following definitions of **root** and **contributing causes**.

- **Root cause**: A primary factor that led to the noncompliance event
- **Contributing cause**: A secondary factor that led to the noncompliance event

The survey identified 12 general categories of causes. Each general category was then subdivided into specific causes, a total of 74. An "other" category also was provided for cases in which the predefined categories did not describe the root or contributing cause(s) of a

WWW Site

A copy of the EPA/CMA Root Cause Analysis Pilot Project Survey is available at the following Internet address:

<http://es.epa.gov/oeca/ccsmd/ogp/survey.pdf>

noncompliance event adequately. Appendix C lists general categories of causes and specific causes identified in the survey. Respondents were asked to select no more than three root causes from among the 74 specific causes and to select any number of contributing causes to characterize the noncompliance event. To facilitate completion of the survey, respondents were directed to address similar noncompliance events as a single event. For example, if a facility had a number of noncompliance events related to reporting requirements under the Clean Air Act (CAA), all such events were identified as a single noncompliance event. Throughout this document, the general categories of causes and specific causes are printed in ***bold italic*** type and *italic* type, respectively.

Demographics of Responding Facilities

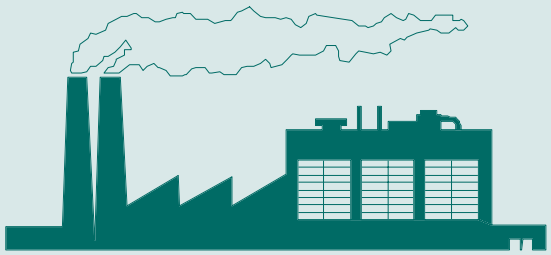
The survey requested basic demographic information, including:

- Primary SIC code of the facility
- Number of employees located at the facility at the time of the noncompliance event (full-time employees and contractors)
- Description of the activities currently conducted at the facility
- Number of years the facility has been in operation
- Job responsibilities of the person(s) completing the survey[1]

The demographic information provides background information about the facilities at the time of the noncompliance event, as well as at the time the survey was completed.

Profile of Typical Participating Facility

- Primary SIC code 2869, Industrial Organic Chemicals, Not Elsewhere Classified
- More than 100 full-time employees
- Conduct of chemical production activities
- In operation for more than 10 years



Example Category of Cause and Associated Specific Causes

Category:

Human Error

Causes:

1. *Individual responsibility or professional judgment*
2. *Fatigue, lack of alertness, distraction*
3. *Inexperience, lack of knowledge, lack of technical expertise*
4. *Other (specify)*

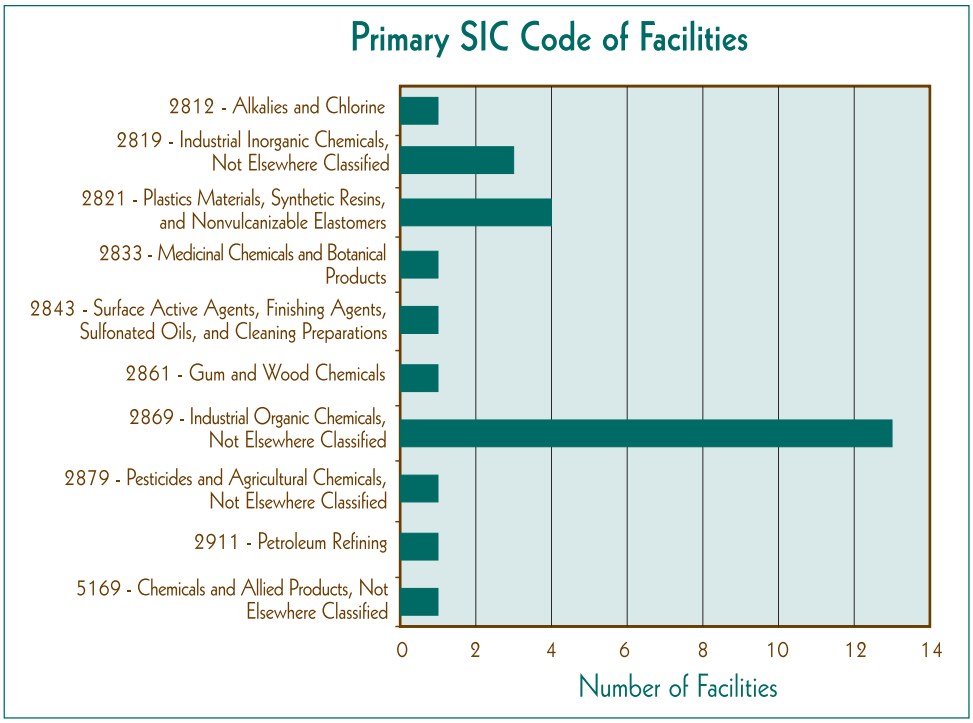
[1] *In 13 responses, more than one person was identified as having helped to complete the survey.*

Of the 27 facilities that responded to the survey, almost half (48%) identified their primary SIC code as 2869. The figure below presents the SIC codes identified by the respondents.

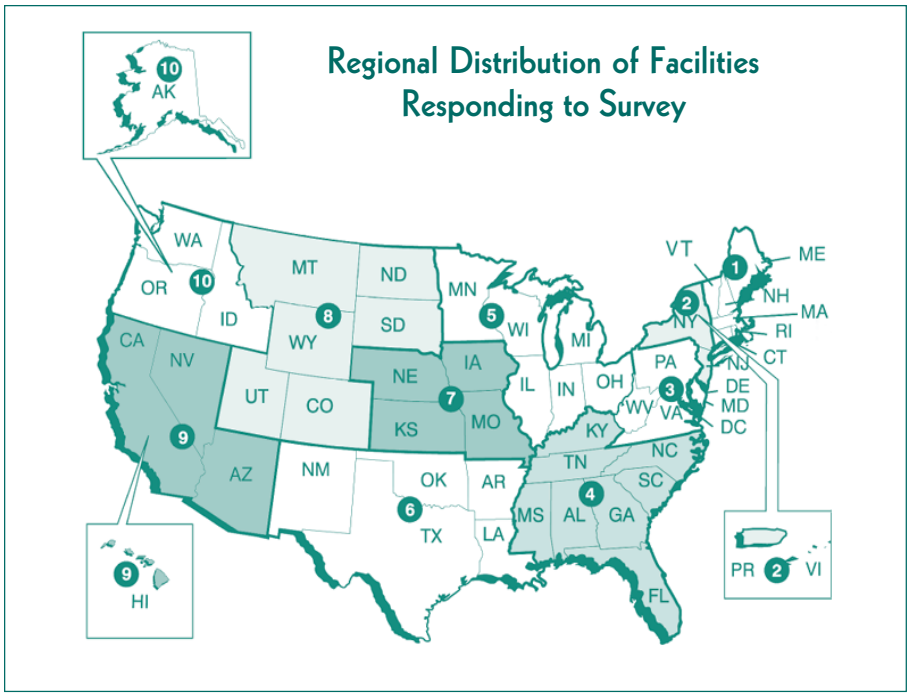
A majority of respondents (81%) stated that their facilities employed more than 101 full-time employees and 0 to more than 500 full-time contractors at the time of the noncompliance event.

A majority of survey respondents (81%) stated that chemical production activities currently are conducted at the facility. All the respondents indicated that their facilities had been operating for more than 10 years.

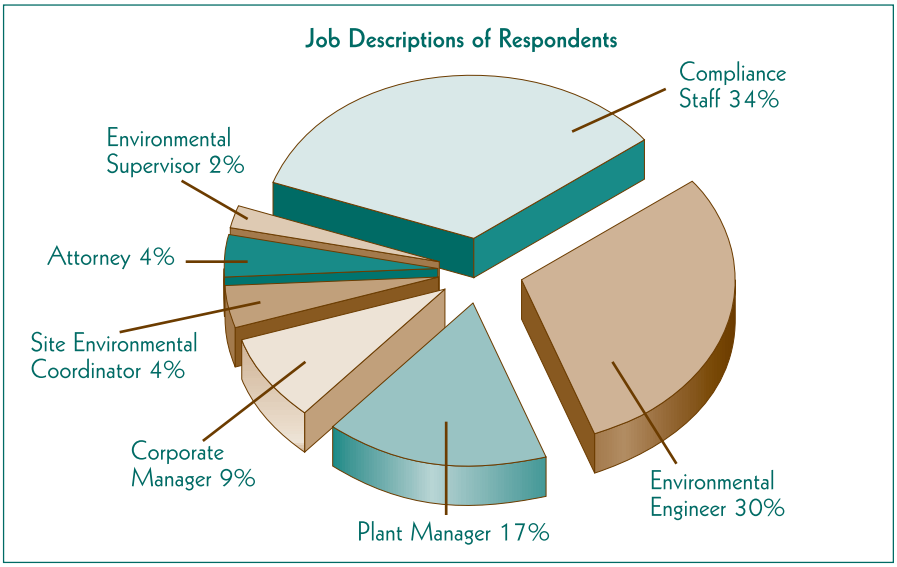
Facilities located in EPA regions 2, 3, 5, 6, and 9 responded to the survey, as the map below shows.



The job responsibilities most commonly reported by the individuals completing the survey were compliance staff and environmental engineer, as the figure on the next page shows.

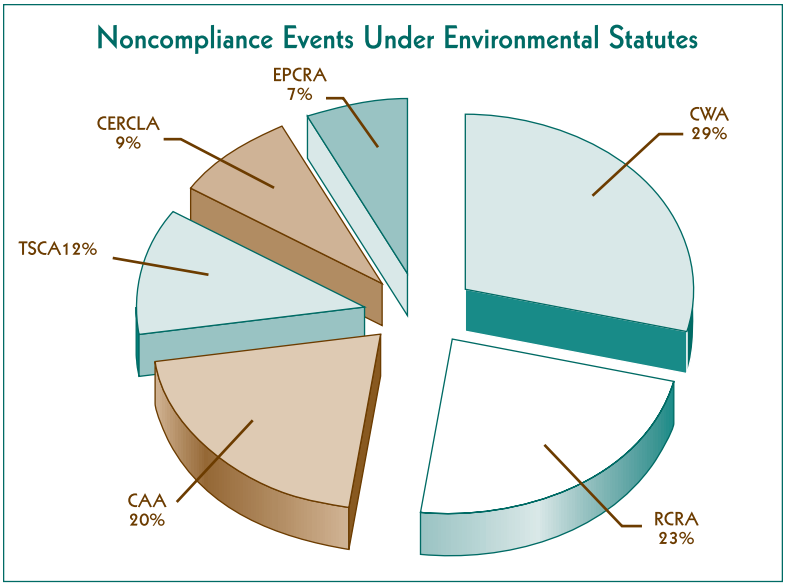


Region 2 – 9 Facilities
Region 3 – 1 Facility
Region 5 – 2 Facilities
Region 6 – 14 Facilities
Region 9 – 1 Facility



Applicability of Environmental Statutes

Responses to the survey associated noncompliance events with six federal environmental statutes. Appendix D presents a more detailed discussion of the responses, organized according to statute. The figure below illustrates the distribution of noncompliance events under the various environmental statutes identified by respondents. Because the study only covered federal enforcement actions, the data may disproportionally identify noncompliances under statutes for which EPA, rather than states, has primary enforcement authority. The relative ranking of noncompliance events by environmental statute is similar to the relative ranking of violations by environmental statute identified in a study of the entire SIC major group 28 (Chemicals and Allied Products) universe for the time period 1990 to 1994. Both studies identified RCRA, the CWA, and the CAA as the statutes under which the largest numbers of noncompliance events or violations occurred. The *Chemical Industry National Environmental Baseline Report 1990-1994* (EPA 305-R-96-002) provides more information on the SIC code 28 universe and the compliance history of those facilities.



Environmental Statutes Identified in Surveys*

- Clean Air Act (CAA)
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Clean Water Act (CWA)
- Emergency Planning and Community Right-To-Know Act (EPCRA)
- Resource Conservation and Recovery Act (RCRA)
- Toxic Substances Control Act (TSCA)

** No noncompliance events related to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) were identified by respondents.*

Chapter 2

Noncompliance and Root Causes

Chapter Highlights

The four categories of noncompliance identified most frequently are:

- Report Submissions and Reporting
- Exceedance
- Operations and Maintenance
- Record Keeping

The six ***categories of causes*** and *specific causes* in each category identified most frequently as root causes are:

- ***Regulations and Permits*** - *Facility unaware of applicability of a regulation*
- ***Human Error*** - *Individual responsibility or professional judgment*
- ***Procedures*** - *Operating procedure not followed*
- ***Equipment Problems*** - *Design or installation*
- ***External Circumstances*** - *Contracted services, such as haulers or handlers*
- ***Communications Difficulties*** - *Between facility and regulatory agencies*

The four ***categories of causes*** identified most frequently as contributing causes are:

- ***Management***
- ***Procedures***
- ***Regulations and Permits***
- ***Compliance Monitoring***

Discussion

This chapter presents the survey findings about noncompliance events and their root causes. The first section organizes the findings according to the four most frequently reported categories of noncompliance:

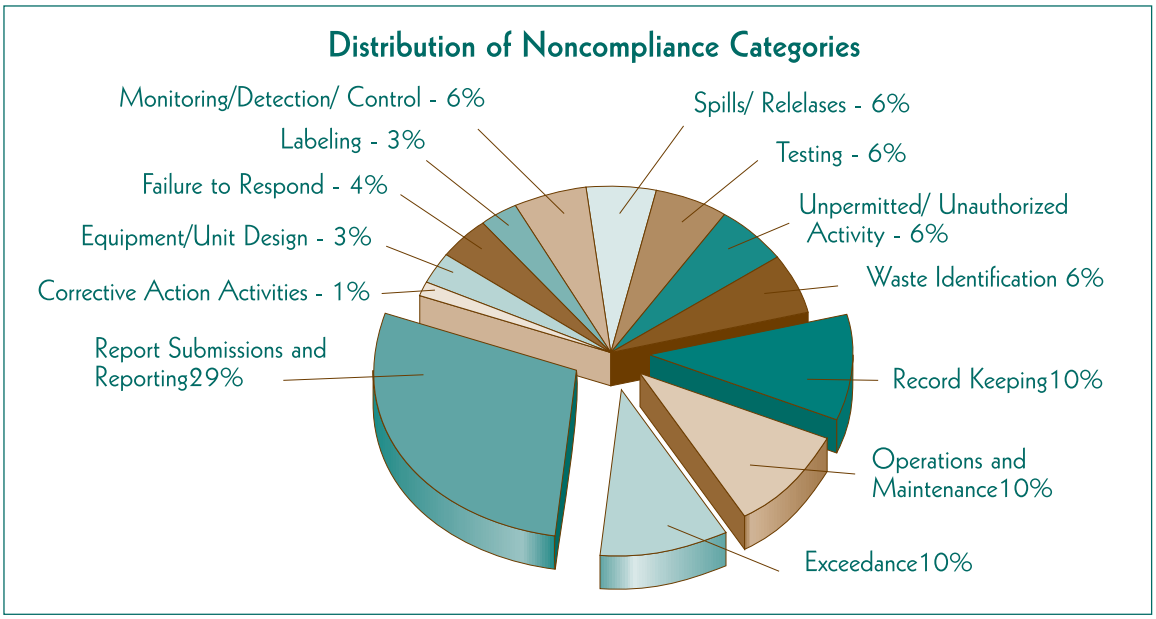
- Report Submissions and Reporting
- Exceedance
- Operations and Maintenance
- Record Keeping

The second section organizes the findings according to the six root cause categories of noncompliance events identified most frequently:

- ***Regulations and Permits***
- ***Human Error***
- ***Procedures***
- ***Equipment Problems***
- ***External Circumstances***
- ***Communications Difficulties***

Two frequently identified contributing causes of noncompliance events that were not identified frequently as root causes—***management*** and ***compliance monitoring***—also are discussed.

Respondents were asked to describe noncompliance events by categorizing each finding of noncompliance addressed in the complaint(s) or settlement document(s).[2] The 27 respondents identified a total of 69 noncompliance events. For the 15 categories provided, the figure below depicts the distribution of noncompliance categories reported by respondents.



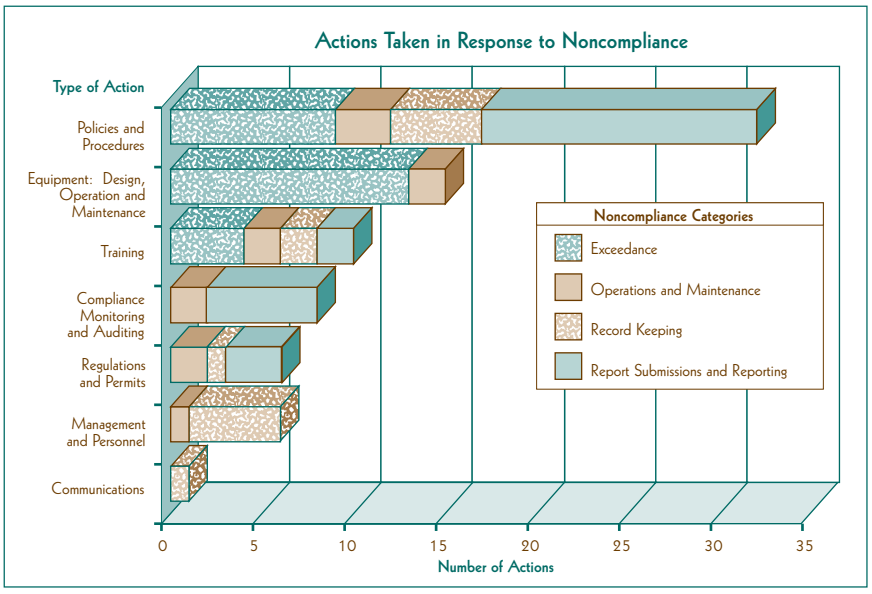
[2] *Two noncompliance categories, Legal Agreement and Training/Certification, were not identified by respondents.*

Respondents also described the actions taken by the facility in response to noncompliance events. The actions identified by the respondents were classified in one of seven categories.

Categories of Actions Taken in Response to a Noncompliance Event

Category	Any addition to or clarification or modification of -
Policies and Procedures	The philosophy of and overall approach to environmental management and daily operations
Equipment	Any machine, machine part, or other device used in a facility's process
Training	Education programs for personnel (full-time employees and contractors) related to environmental awareness, requirements, and procedures
Compliance Monitoring and Auditing	Tracking and oversight of a facility's operations
Regulations and Permits	A regulation or permit requirement
Management	Supervisor's and planner's approach to ensuring that staffing of the facility is appropriate and that daily operations proceed smoothly
Communication	Strategies for communication among facility managers, employees, contractors, and regulators

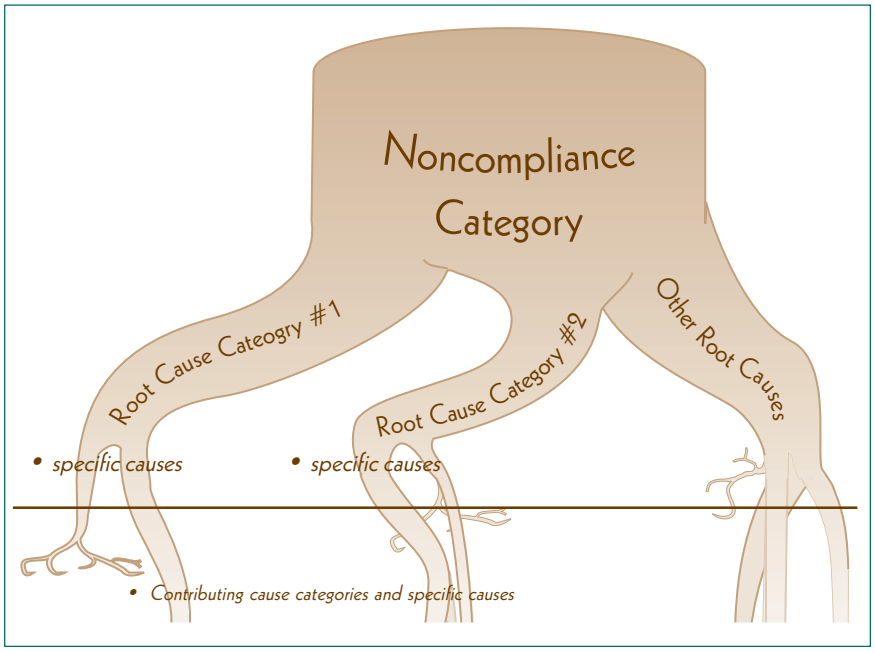
The following figure illustrates the actions taken in response to noncompliance events in the four categories identified most frequently. Generally, facilities initiated a number of actions to address a single noncompliance event. Most actions taken were managerial or administrative in nature—pertaining to policy,



procedures, reporting, or training. Actions characterized as policies and procedures were initiated most frequently (44% of actions) in response to noncompliance events. Actions characterized as policies and procedures were initiated in response to noncompliance events related to all statutes identified by respondents.

Noncompliance Events

The four noncompliance categories identified most frequently, as well as the categories of causes, specific root causes, and specific contributing causes associated with them, are illustrated throughout this section by graphics similar to the one below. Generally, facilities identified a number of causes for a single noncompliance event.



Report Submissions and Reporting

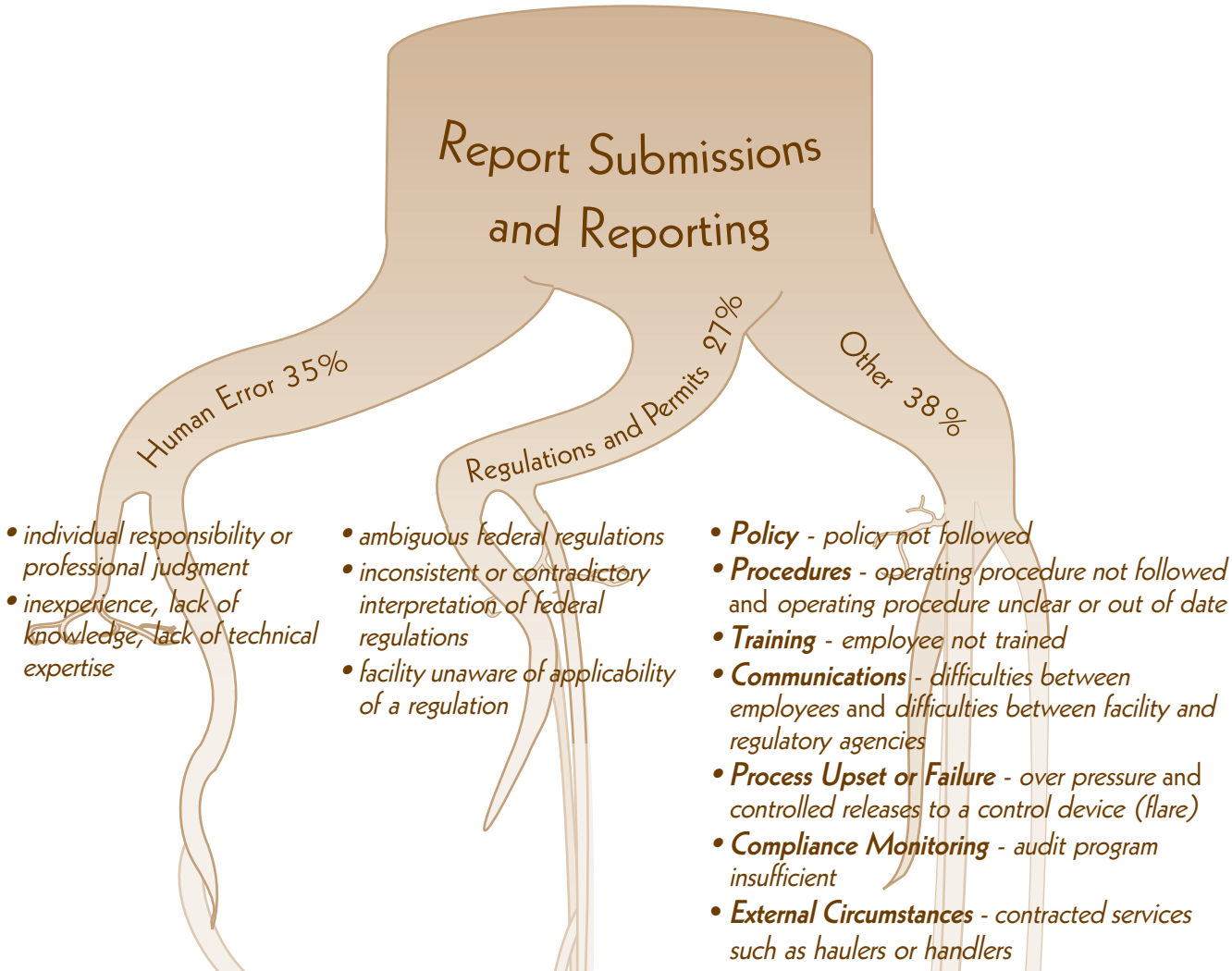
The noncompliance category respondents identified most frequently was report submissions and reporting. Noncompliance events related to reporting occurred at 56 percent of responding facilities. The relative frequency of reporting noncompliance events may be attributable to the inclusion of reporting requirements in all environmental statutes. Reporting is an integral component of the environmental regulations and enables EPA and the states to monitor facilities' compliance with those regulations. EPA also believes reporting requirements permit the regulating agency to evaluate the level of protection provided to human health, welfare and the environment. Some statutes or portions of statutes, such as EPCRA and CERCLA section 302, consist almost exclusively of reporting requirements.

Respondents identified noncompliance events related to reporting for all statutes; however, 65 percent of such noncompliance events were related to reporting requirements under CERCLA, the CWA, or EPCRA.

Respondents associated nine root causes with noncompliance events related to reporting; as the figure to the right illustrates. The root cause categories identified most frequently for noncompliance events related to reporting were ***regulations and permits*** (27%) and ***human error*** (35%). The specific causes associated with those root causes included:

- ***Human error:*** *Individual responsibility or professional judgment* and *inexperience, lack of knowledge, lack of technical expertise*
- ***Regulations and permits:*** *Facility unaware of applicability of a regulation, ambiguous federal regulations*, and *inconsistent or contradictory interpretation of federal regulations*

The majority of facilities responding (81%) indicated that at least one action had been taken in response to the event. More than one-third (38%) changed their internal processes or procedures to prevent the recurrence of similar noncompliance events.



Contributing Causes

- ***Human error*** - *individual responsibility or professional judgment; fatigue, lack of alertness, distraction;* and *inexperience, lack of knowledge, lack of technical expertise*
- ***Procedures*** - *record keeping procedures inadequate* and *reporting or notification procedures unclear*
- ***Management*** - *staffing—inappropriate level or expertise, environmental aspects of facility process and operations not identified; oversight not provided;* and *control and oversight of purchased materials, equipment, and services not provided or inadequate*
- ***Communications*** - *difficulties between employees* and *difficulties between facility and regulatory agencies*
- ***Emergency preparedness*** - *emergency preparedness plan insufficient* and *emergency preparedness plan implementation issues*
- ***Compliance Monitoring*** - *audit program insufficient* and *no system to ensure timely submission of environmental reports to regulatory agency*
- ***Regulations and permits*** - *ambiguous federal regulations; contradiction between state and federal regulations; inconsistent or contradictory interpretation of federal regulations; contradictory interpretation by federal agency; ineffective reporting structure;* and *Q&A on new regulation not sufficient*
- ***External circumstances*** - *contracted services such as haulers or handlers* and *external phenomenon (for example, weather, theft, flood, fire)*
- ***Equipment problems*** - *ordinary wear-and-tear*

Exceedance

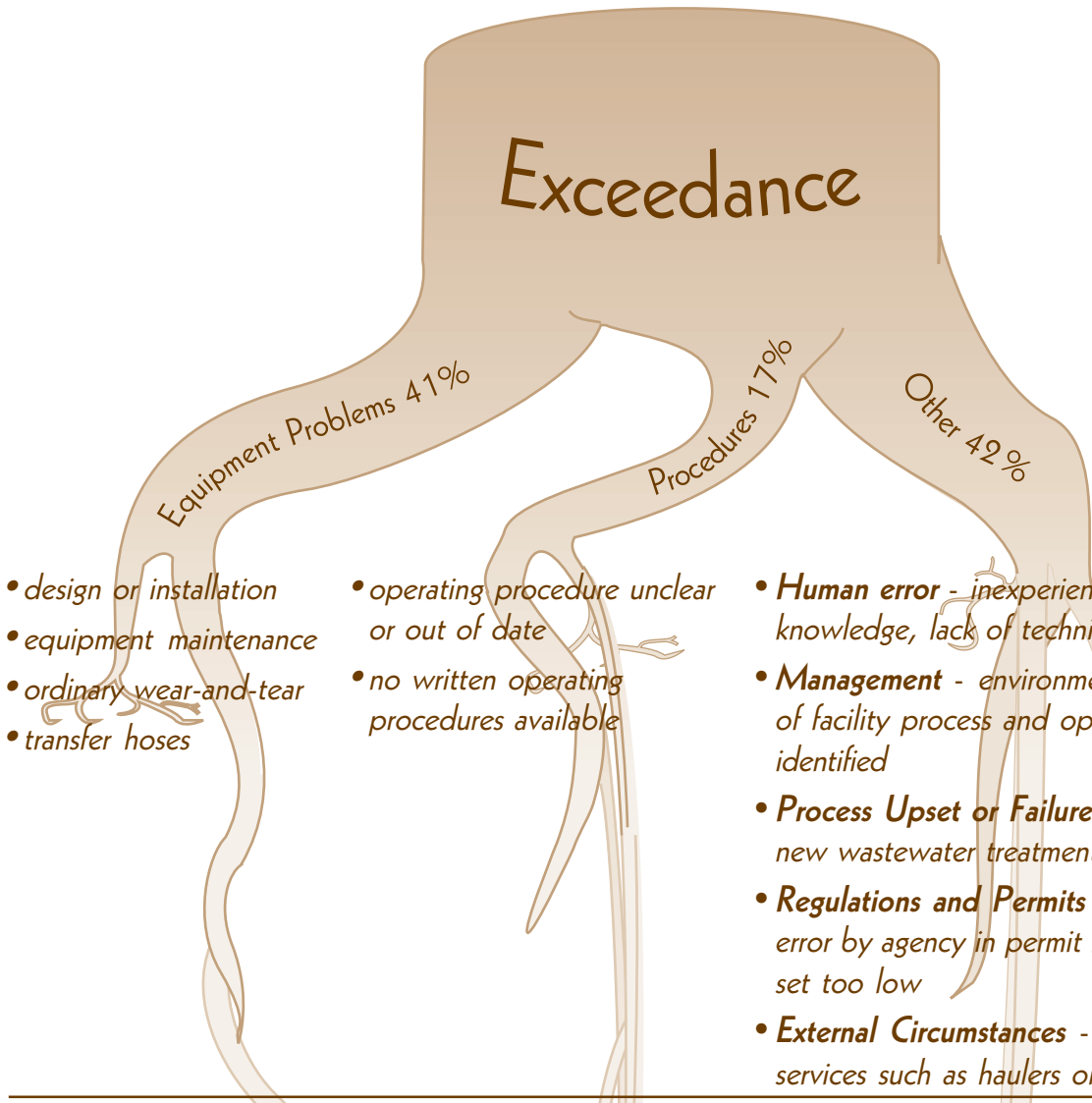
Every noncompliance event respondents identified as an exceedance involved discharge limits under the CWA.

Exceedances occurred at 26 percent of the responding facilities. Respondents associated seven root causes with exceedance noncompliance events; as the figure to the right illustrates. The root cause categories identified most frequently for exceedance noncompliance events were ***equipment problems*** (41%) and ***procedures*** (17%). The specific causes associated with those root causes include:

- ***Equipment problems:*** *Equipment design or installation, equipment maintenance, ordinary wear-and-tear,* and *transfer hoses*
- ***Procedures:*** *No written operating procedures available* and *unclear or out-of-date procedures*

Management was a significant contributing cause to exceedance noncompliance events. When ***management*** was identified as a contributing cause, specific causes identified were *environmental aspects of facility process, and operations not identified,* and *environmental planning or budgeting not completed*.

All respondents said that they took actions in response to the exceedances. A majority (86%) of the facilities added or modified equipment to prevent the recurrence of similar noncompliance events. Many facilities (71%) changed internal procedures, operation manuals, or reporting activities, while 57 percent trained or retrained employees.



- *design or installation*
- *equipment maintenance*
- *ordinary wear-and-tear*
- *transfer hoses*

- *operating procedure unclear or out of date*
- *no written operating procedures available*

- ***Human error** - inexperience, lack of knowledge, lack of technical expertise*
- ***Management** - environmental aspects of facility process and operations not identified*
- ***Process Upset or Failure** - startup of new wastewater treatment facility*
- ***Regulations and Permits** - calculational error by agency in permit resulted in limit set too low*
- ***External Circumstances** - contracted services such as haulers or handlers*

Contributing Causes

- ***Human error** - fatigue, lack of alertness, distraction* and *spills, specific cause not known*
- ***Policies** - environmental objectives and targets unclear* and *pollution control technologies or other technical equipment needs not assessed*
- ***Procedures** - operating procedure not followed, no written operating procedures available,* and *definitions of roles and responsibilities unclear*
- ***Management** - no formal management structure to address noncompliance and follow-through, environmental aspects of facility process and operations not identified,* and *environmental planning or budgeting not completed*
- ***Training** - training materials unclear or outdated*
- ***Compliance monitoring** - audit follow-up procedures insufficient*
- ***Regulations and permits** - ambiguous state regulations, contradiction between state and federal regulations, inconsistent or contradictory interpretation of federal regulations,* and *permit parameter not measurable in real time*
- ***Equipment problems** - design or installation* and *equipment maintenance*

Operations and Maintenance

Noncompliance events related to operations and maintenance (O&M) were identified at 22 percent of the facilities responding. Such noncompliance events were identified most frequently under the CAA (57%). Because the CAA regulations establish a number of detailed operating procedures for end-of-pipe controls, as well as work practice standards, the frequency with which O&M noncompliance events under the CAA were identified is not surprising.

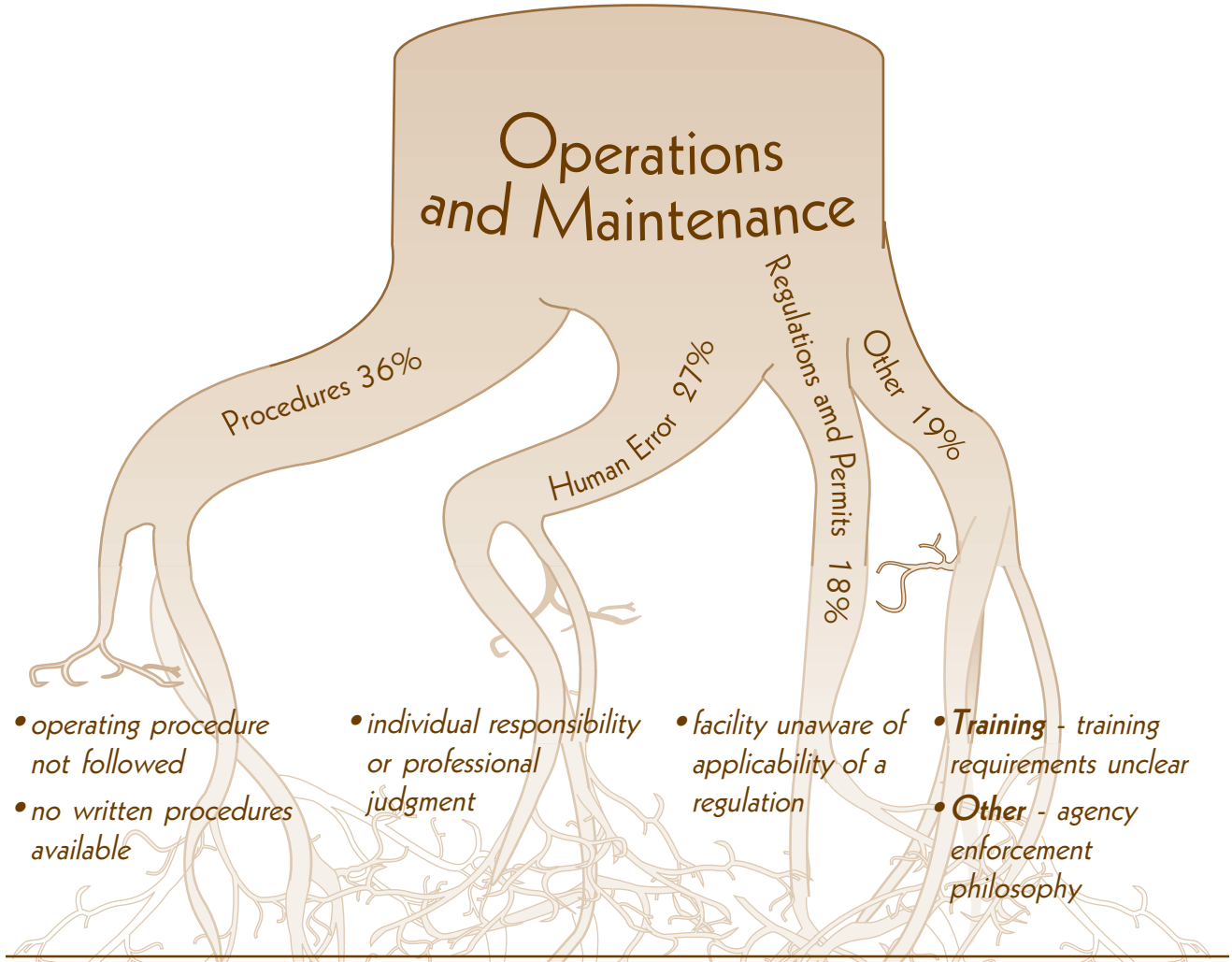
Respondents associated five root causes with O&M noncompliance events; as the figure to the right illustrates. The root cause categories identified most frequently for O&M noncompliance events were ***procedures*** (36%), ***human error*** (27%), and ***regulations and permits*** (18%). The specific causes associated with those root causes include:

- ***Procedures:*** *Operating procedure not followed* and *unavailability of written procedures*
- ***Human error:*** *Individual responsibility or professional judgment*
- ***Regulations and permits:*** *Facility unaware of the applicability of a regulation*

The two primary contributing causes were ***compliance monitoring*** and ***management***. When ***compliance monitoring*** was identified as a contributing cause, *lack of or insufficient compliance checks or audits* was identified as a specific cause. When ***management*** was identified as a contributing cause, *environmental aspects of facility process, and operations not identified,* and *staffing level or expertise inappropriate* were identified as specific causes.

All but one respondent indicated that actions had been taken in response to an O&M noncompliance event. The actions taken varied but included, in order of frequency:

- Modification or development of procedures
- Redesign, replacement, or maintenance of equipment
- Addition of auditing procedures to check open-ended lines for plugs
- Provision of incentives for consistent compliance



Contributing Causes

- ***Human error*** - *individual responsibility or professional judgment*
- ***Policies*** - *policy not followed*
- ***Procedures*** - *operating procedure not followed, definition of roles and responsibilities unclear,* and *pre-startup review not conducted or inadequate*
- **Management** - *management support or guidance not provided, staffing—inappropriate level or expertise,* and *environmental aspects of facility process and operations not identified*
- ***Compliance monitoring*** - *audit program insufficient, routine site and equipment compliance checks not conducted,* and *audit program not sufficiently detailed*
- ***Regulations and permits*** - *inconsistent or contradictory interpretation of state regulations*
- ***Equipment problems*** - *equipment maintenance*

Record Keeping

Noncompliance events related to record keeping occurred at 19 percent of facilities responding. These noncompliance events were identified most frequently under the CAA (43%), but also occurred under the CWA, RCRA, and TSCA. Noncompliance events under the CAA involved National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations. Noncompliance events under the CWA involved requirements governing the preparation of spill prevention control and countermeasures (SPCC) plans. Record keeping is an integral component of environmental regulations that enables EPA and the states to monitor facilities' compliance with those regulations. EPA also believes record keeping requirements permit the agency to evaluate the level of protection provided to human health, welfare and the environment.

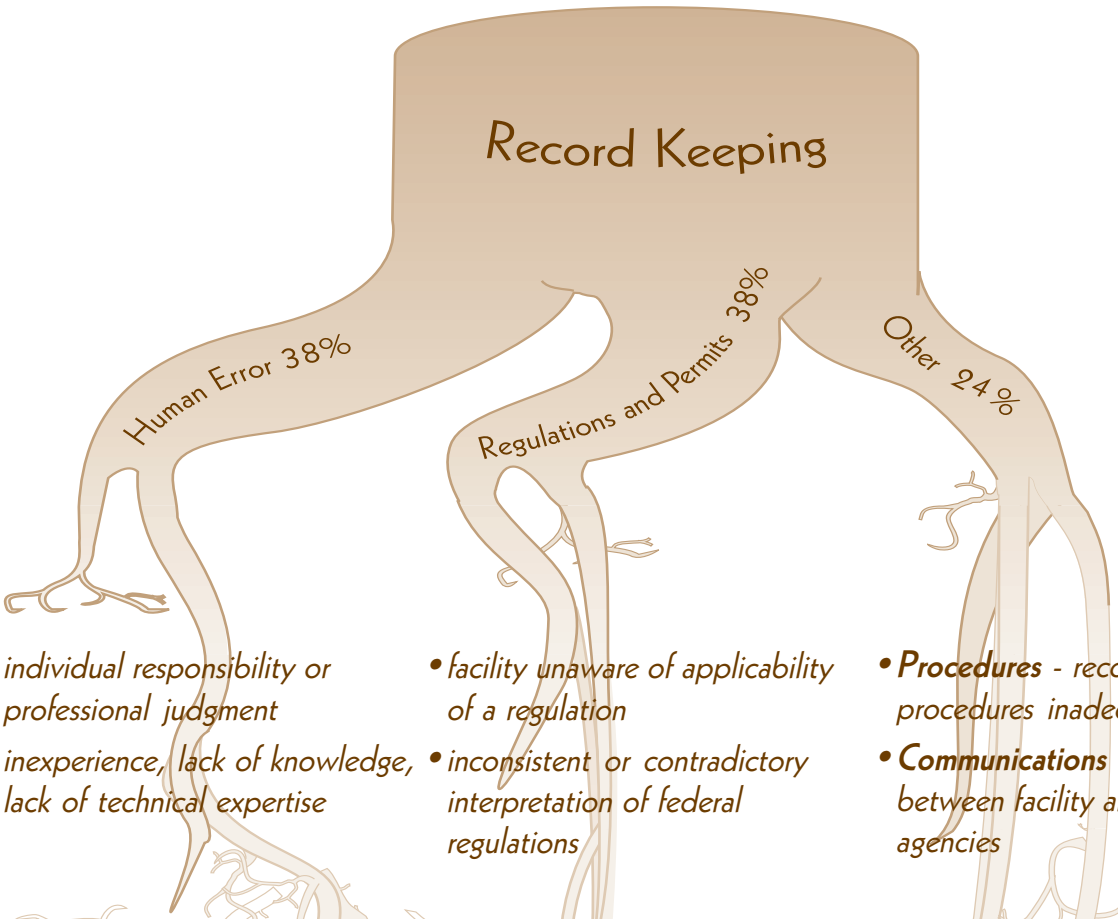
Respondents identified four root cause categories associated with record keeping requirements: ***human error, regulations and permits, procedures,*** and ***communications difficulties***, as the figure to the right illustrates. The root cause categories identified most frequently for record keeping noncompliance events were ***regulations and permits*** (38%) and ***human error*** (38%). The specific causes associated with those root causes include:

- ***Regulations and permits***: *Facility unaware of the applicability of a regulation* and *inconsistent or contradictory interpretation of federal regulations*
- ***Human error***: *Inexperience or lack of knowledge*

When ***regulations and permits*** was identified as a root cause of noncompliance events related to record keeping, ***communications difficulties*** *between facility and regulatory agencies* also was identified as a root cause.

Contributing causes associated with record keeping noncompliance events include *lack of employee training*, *unclear definitions of roles and responsibilities*, *unavailable written procedures*, *inappropriate level of expertise*, and *unidentified environmental aspects of the facility process*.

All but one respondent indicated that actions had been taken in response to noncompliance events related to record keeping. Most of the actions taken involved development or revision of procedures (71%). Other actions involved the training or retraining of employees (29%).



- *individual responsibility or professional judgment*
- *inexperience, lack of knowledge, lack of technical expertise*

- *facility unaware of applicability of a regulation*
- *inconsistent or contradictory interpretation of federal regulations*

- ***Procedures** - record keeping procedures inadequate*
- ***Communications** - difficulties between facility and regulatory agencies*

Contributing Causes

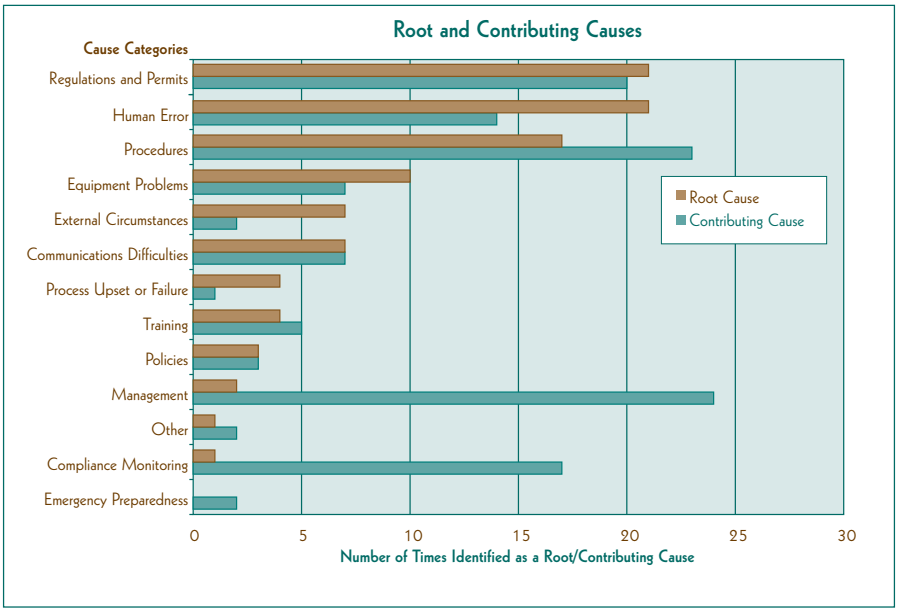
- ***Human error** - inexperience, lack of knowledge, lack of technical expertise*
- ***Procedures** - no written operating procedures available, definition of roles and responsibilities unclear,* and *reporting or notification procedures unclear*
- ***Management** - staffing—inappropriate level or expertise* and *environmental aspects of facility process and operations not identified*
- ***Training** - employee not trained*
- ***Regulations and permits** - ambiguous federal regulations, contradiction between state and federal regulations, inconsistent or contradictory interpretation of state regulations,* and *rule implementation time frames are too short*

Root and Contributing Causes

This discussion examines the six root causes of noncompliance events respondents identified most frequently. Root causes are discussed in the order of the frequency with which they were identified, from most to least often.

- ***Regulations and Permits***
- ***Human Error***
- ***Procedures***
- ***Equipment Problems***
- ***External Circumstances***
- ***Communications Difficulties***

Two contributing cause categories that were not identified frequently as root causes—***management*** and ***compliance monitoring***—also are discussed. The table below provides an overview of the categories and the number of times respondents identified them.



Regulations and Permits

The root cause categories identified most frequently for noncompliance events were ***regulations and permits*** and ***human error***. ***Regulations and permits*** also was the third most frequently identified category of contributing causes. ***Regulations and permits*** was identified as a root cause of noncompliance under all statutes except CERCLA. The specific cause *facility unaware of the applicability of a regulation* was identified only for noncompliance events under the CAA and TSCA. On the other hand, the specific cause *ambiguous or inconsistent federal regulations* generally was identified for noncompliance events under EPCRA and RCRA.

Specific causes in the *Regulations and Permits* category that were identified frequently include:

Facility unaware of applicability of a regulation 52%

Inconsistent or contradictory interpretation of federal regulations 19%

Ambiguous federal regulations 14%

In cases in which facilities were *unaware of the applicability of a regulation*, other root causes of the noncompliance identified were ***human error*** and ***procedures***. When *ambiguous or inconsistent federal regulations* was identified as a specific cause, ***communication difficulties*** *between facility and regulatory agencies* was the only associated root cause identified.

Human Error

The category ***human error*** was identified as frequently as ***regulations and permits*** as the root cause of noncompliance. Specific causes in the ***human error*** category were identified by respondents as either *individual responsibility or professional judgment* or *inexperience, lack of knowledge, lack of technical expertise*. The ***human error*** category was identified as a root cause of noncompliance under all statutes except CERCLA.

In four cases, ***individual responsibility*** *or* ***professional judgment*** was identified as the sole cause of a noncompliance event. That cause was the only one for which more than one respondent did not identify another root or contributing cause for a noncompliance event. Although ***individual responsibility*** *or* ***professional judgment*** was identified in those cases as the sole cause of noncompliance, three of the facilities reported that they had implemented changes in their procedures to prevent recurrence of the noncompliance event.

When ***individual responsibility*** *or* ***professional judgment*** was identified as a root cause, ***procedures*** frequently was identified as an associated root or contributing cause.

Lack of training and ***communication difficulties*** seldom were identified as contributing causes when ***human error*** or ***procedures*** were identified as the root cause. That circumstance is surprising, given the widely held opinion that training and improved communication are effective ways to reduce human error.

Specific causes in the *Human Error* category that were identified frequently include:

Individual responsibility or professional judgment	67%
Inexperience, lack of knowledge, lack of technical expertise	33%

Procedures

Procedures was identified as a root cause of 17 percent of the noncompliance events. Specific causes in the ***procedures*** category identified most frequently were *operating procedures not followed* and *no written operating procedures available*. The ***procedures*** category was identified as a root cause of noncompliance under five environmental statutes: the CAA, CERCLA, the CWA, RCRA, and TSCA.

Other root causes associated with the ***procedures*** category include ***human error, regulations and permits, communications difficulties,*** and ***procedures.***

In cases in which ***procedures*** was identified as a root cause, ***procedures*** were also identified frequently as a contributing cause as were ***compliance monitoring*** and ***management.***

Specific causes in the *Procedures* category that were identified frequently include:

Operating procedure not followed	47%
No written operating procedures available	29%

Equipment Problems

Equipment problems was identified as a root cause of 10 percent of the noncompliance events. The specific causes identified in the ***equipment problems*** category included *design or installation*, *equipment maintenance*, and *ordinary wear-and-tear*. For 50 percent of such noncompliance events, more than one ***equipment problem*** was identified. The table below lists the specific types of equipment involved in noncompliance events. Other root causes associated with ***equipment problems*** included ***external circumstances*** and ***procedures***.

Only two environmental statutes, the CWA (70%) and RCRA (30%), were identified in connection with noncompliance events caused by ***equipment problems***.

Specific causes in the Equipment Problems category that were identified frequently include:

Design or installation	40%
Equipment maintenance	20%
Ordinary wear-and-tear	20%

Specific Equipment Problems

Equipment Type	Function Lost
Wastewater treatment system	Gross volume that provided equalization
Tanks, vessels, and reactors	Surge capacity (wastewater equalization)
Curbing and dikes	Containment

External Circumstances

External circumstances was identified as a root cause of 7 percent of the noncompliance events. For 72 percent of such noncompliance events, *contracted services such as haulers or handlers* was identified as the specific cause. In those cases, ***procedures*** frequently was identified as a related root cause or contributing cause.

Only three environmental statutes, the CWA (72%), the CAA (14%), and RCRA (14%), were identified in association with noncompliance events caused by ***external circumstances***.

Specific causes in the *External Circumstances* category that were identified frequently include:

Contracted services, such as haulers or handlers	72%
External phenomenon	14%
Sitewide power failure	14%

Communications Difficulties

Communications difficulties was identified as a root cause of 7 percent of the noncompliance events. Specifically, *difficulties between facility and regulatory agency* was identified frequently. When *difficulties between the facility and regulatory agencies* was identified as a root cause, ***regulations and permits*** frequently was identified as an associated root cause.

The category ***communications difficulties*** was identified as a root cause of noncompliance under four environmental statutes, TSCA (57%), the CAA (14%), the CWA (14%), and RCRA (14%).

Specific causes in the *Communications Difficulties* category that were identified frequently include:

Between facility and regulatory agencies	57%
Between employees	29%

Contributing Causes

Although rarely identified as root causes of noncompliance, ***management*** and ***compliance monitoring*** were identified frequently as contributing causes of noncompliance events (see the figure on page 20). ***Management*** was identified most often as a contributing cause in cases in which ***regulations and permits*** or ***procedures*** was identified as a root cause of a noncompliance event. ***Compliance monitoring*** was identified frequently as a contributing cause in cases in which ***procedures*** was identified as a root cause.

Chapter 3

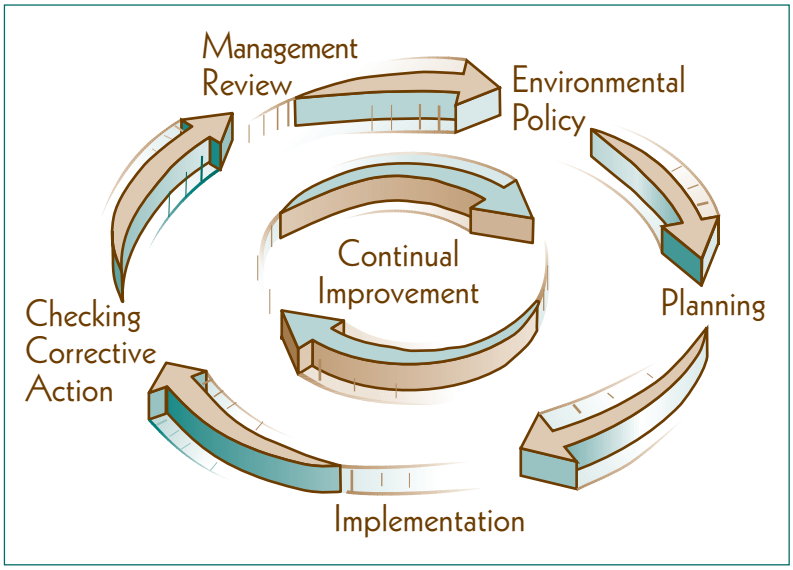
Environmental Management Systems and Compliance

Chapter Highlights

Survey responses indicate that there is a strong relationship between the implementation of EMSs and compliance. Responses also suggest that comprehensive EMSs—with elements working together and continually evaluated—should improve compliance.

- The majority of responses identified environmental audit programs; corporate policies, goals, targets, and guidelines; and Responsible Care® as management methods that have a strong influence on environmental performance.
- Among the respondents, 78 percent modified their EMSs in response to noncompliance.
- Among the respondents, 41 percent stated that Responsible Care® or another EMS would have contributed to the prevention of the noncompliance.
- Among actions taken in response to noncompliance, 70 percent are considered by the project team to be relevant to an EMS.

Discussion



Increasingly, private- and public-sector organizations are using EMSs to manage (to control and minimize) the environmental effects of their activities. An EMS is an organized process established by policy to integrate planning, implementation, corrective action, and management review. An EMS specifies the structure, personnel, procedures, practices, and resources that will play a role in controlling and minimizing the effects of a company's operations. EMSs typically include continuous improvement through a "plan-do-check-act" cycle, as the figure to the right illustrates.

An important component of an EMS is to routinely evaluate and improve the entire EMS program, which, in doing so, requires management attention. Because an EMS, by itself, cannot assure compliance, management and employee awareness and participation are crucial to help achieve and maintain compliance.

Survey recipients were not provided a definition of an EMS to use as a guide in completing the survey. It is understood that different organizations have diverse views about the definition and scope of an EMS. This chapter presents the findings of the survey related to EMSs. In particular, this chapter illustrates the strong relationship between EMSs and compliance.

Background

In 1988, CMA launched Responsible Care® in response to public concerns about the manufacture and use of chemicals. Through Responsible Care®, member companies are committed to the support of a continuing effort to improve the industry's responsible management of chemicals. Responsible Care® is an obligation of membership in CMA and requires member companies to:

- Improve performance in health, safety, and environmental quality
- Listen and respond to public concerns
- Assist each other in achieving optimal performance
- Report their progress to the public

The Guiding Principles—the philosophy of Responsible Care®—outline each member company's commitment to environmental, health, and safety responsibility in managing chemicals. Six Codes of Management Practices, which are the heart of Responsible Care®, outline practices that cover virtually every aspect of the manufacturing, transportation, and handling of chemicals. CMA subsequently developed the Responsible Care® Management System Verification concept, which organized the six codes into a single system.

For its part, EPA is particularly interested in the extent to which EMSs contribute to improved compliance and pollution prevention.[3] Specifically:

- EPA believes that implementation of an EMS has the potential to improve an organization's environmental performance and compliance with regulatory requirements
- EPA encourages the use of EMSs that focus on improved environmental performance and compliance as well as source reduction (pollution prevention) and system performance

At the time of preparation of this report, EPA does not base any regulatory incentives solely on the use of EMSs or EMS certifications.

Appendix E provides summary discussions of three EMS initiatives: Responsible Care®, ISO 14001, and the National Enforcement Investigations Center (NEIC) EMS Criteria.

EMS Findings

The survey included several questions about EMSs. The questions addressed (1) the extent to which Responsible Care® or another EMS was in place before the noncompliance event and (2) whether the system had been modified after the noncompliance event. The survey asked questions about discrete elements and characteristics of EMSs; however, determining the extent to which those elements and characteristics are integrated and linked to form an active, comprehensive EMS was outside the scope of the survey.

EMS elements

An EMS consists of elements and functions important to active environmental management. Although several EMS guidelines exist, most feature all or most of the following elements:

- Policy
- Environmental aspects
- Audits
- Management review
- Documentation
- Emergency response
- Monitoring and measurement
- Corrective and preventive action
- Compliance requirements
- Objectives
- Training
- Communication

[3] *On March 12, 1998, EPA published a notice in the Federal Register (63 F.R. 12094-12097) to communicate its views about EMSs.*

EMS observations derived from the surveys are organized as follows:

- Implementation status
- Changes in response to noncompliance
- Effect on compliance

Implementation Status

Rather than including a particular definition, the survey inquired broadly about various programs or systems that would include a number of EMS activities. All facilities that responded to the questions employed more than one of the environmental management methods described below.

Use and Influence of Various Environmental Management Methods

Environmental Management Method	Facilities Having Method in Place for:[1]		Average Rank of Influence on Environmental Performance[2]
	>5 years	<5 years	
Environmental Audit Program	78%	7%	2.2
Corporate Policies, Goals, Targets, and Guidelines	85%	11%	2.5
Responsible Care® Management System	66%	26%	2.9
Other EMS	4%	22%	4.4

[1] *The term "years" refers to the number of years the environmental management method had been in place at the time of the survey.*

[2] *Numbers in this column are the average rankings on a scale of 1 to 8, with 1 indicating greatest influence and 8 indicating least influence.*

Respondents ranked environmental audit programs and corporate policies, goals, targets, and guidelines as having the greatest influence on environmental performance. The rankings may reflect the longer period of time during which a particular environmental management method had been in place, compared with Responsible Care® or another EMS. Alternatively, the rankings may indicate the extent to which the various methods are directed toward compliance (for example, audits), rather than broader measures of environmental performance (for example, Responsible Care®).

Environmental audit programs; corporate policies, goals, targets, and guidelines; and Responsible Care® were identified as management methods that have a strong influence on environmental performance.

The survey asked detailed questions about the status of the facility's EMS (Responsible Care® or another EMS) at the time of noncompliance and how the EMS may have been changed after the noncompliance event occurred. Responses to those questions generally indicated widespread implementation of EMS elements at the time of noncompliance. For example, 15 percent of respondents had implemented all elements identified in the survey, and 70 percent of respondents had implemented at least 15 elements of an EMS (of the 25 described in the survey) at the time of noncompliance.

The figures that follow summarize the elements of an EMS that were identified most and least frequently to have been in place at the time the noncompliance event occurred. The elements most frequently

identified as in place were environmental reporting, compliance audits, communication, and emergency response procedures. The widespread implementation of environmental compliance audits at the time of noncompliance is consistent with responses that environmental audit programs had been in place at most facilities surveyed for more than five years and were perceived to have the greatest influence on the facilities' environmental performance. In contrast, the elements least frequently identified as in place at the time of noncompliance were EMS documentation, EMS audits, EMS record keeping, and EMS procedures.

EMS Elements or Features Most Frequently in Place at Time of Noncompliance	Percent of Respondents[1]
Reporting: "There is a system in place to ensure environmental reports required by federal and state regulations are prepared routinely and submitted on a timely basis."	89%
Environmental Compliance Audits:	
• "…are conducted by persons independent of the facility unit that is the subject of the compliance audit."	91%
• "…are conducted at least every 3 years."	88%
• "…results are reported directly to facility management."	88%
• "A formal review is in place for follow-up of exceptions noted in inspections or audits and supported by management review."	88%
Internal Communication: "Staff are encouraged to communicate environmental issues and concerns directly with top management and/or environmental managers."	85%
Emergency Response: "Procedures are established to identify the potential for and response to emergency situations."	85%

EMS Elements or Features Least Commonly in Place at Time of Noncompliance	Percent of Respondents[1]
EMS Documentation: "The facility has developed a written description of the facility EMS that describes its organization and functional structure and elements."	42%
EMS Audits:	
• "The integrity and efficacy of the EMS are periodically reviewed and revisions are made based on this review."	50%
• "Periodic EMS audits are conducted at the facility."	55%
EMS Record Keeping: "The facility has designated a point of contact for records related to the EMS."	62%
Environmental Procedures: "There is a system in place to review and update environmental procedures periodically."	62%

[1] *Percent of respondents who indicated that the element was part of the facility's EMS at the time of noncompliance*

Changes in Response to Noncompliance

The majority of respondents modified their EMS in response to noncompliance.

The survey asked respondents to identify EMS elements that were clarified or added after the noncompliance event occurred. Twenty-one (78%) facilities modified their EMSs in some manner. Most clarifications and additions involved implementation, operation, or accountability. Otherwise, there were no notable trends, with all other clarifications and additions distributed broadly among the elements listed in the survey. Clarifications and additions were made to Responsible Care® and other EMSs with approximately the same frequency. The frequency with which modifications were made to EMSs may have occurred because Responsible Care® and other EMSs were evolving during the period in which the noncompliance events occurred. Elements of an EMS may have been in place at a respondent's facility, but not understood by employees to be part of an EMS. The frequency of modification indicates a trend of modifying EMSs to minimize the recurrence of noncompliance events.

Survey responses indicate a strong relationship between the implementation of EMSs and compliance.

Environmental Impact Inventories . . .

An impact inventory is an assessment of how an organization's activities (aspects) interact with the environment. An impact inventory generally is regarded as a crucial element of most EMS planning activities. Most respondents (63%) that had conducted impact inventories stated that the inventory had a positive effect on compliance.

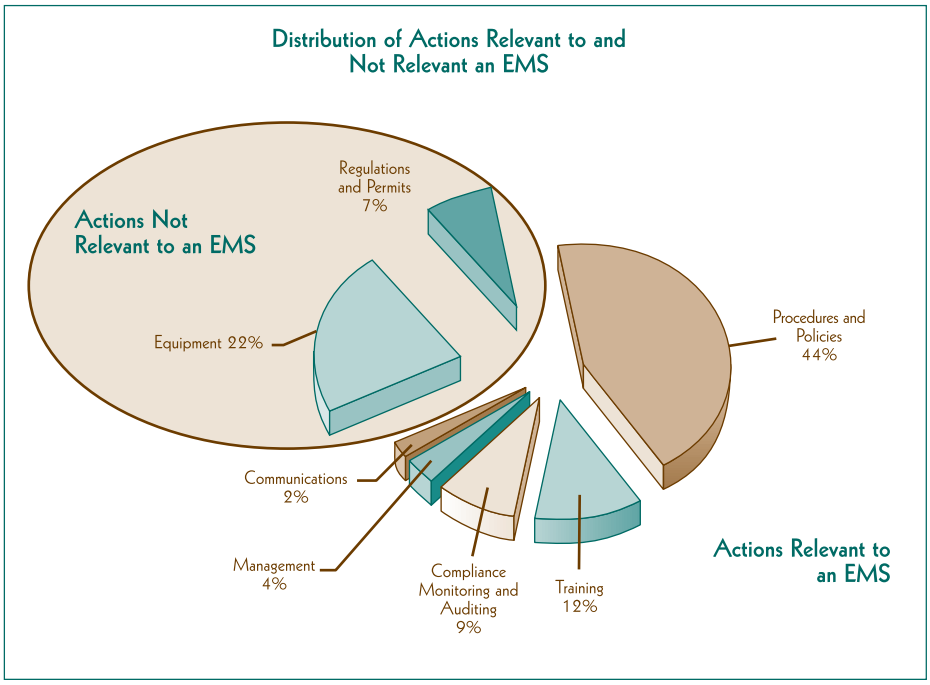
While an EMS plays a large role in preventing noncompliance, implementation and maintenance of a fully functional EMS does not guarantee 100 percent compliance with environmental requirements.

Changes made in an EMS after a noncompliance event occurred also were evaluated in light of the specific actions taken in response to the noncompliance event. The project team classified each of the seven categories of actions taken, described in Chapter 2, as relevant or not relevant to EMS activities or elements. For example, if a facility revised a training program in response to a noncompliance event, that action was considered relevant to the EMS because training is a key element of an EMS. The project team considered all actions taken, except for those categorized as equipment design, operation and maintenance, and regulations and permits, to be relevant to an EMS. The majority (71%) of the actions taken in response to noncompliance were deemed relevant to an EMS. The figure on the next page shows the distribution of the actions relevant to an EMS and other actions taken in response to noncompliance.

Effect on Compliance

Facilities may benefit from exploring the relationship between the root causes of noncompliance and the facility's EMS.

Although implementation and maintenance of a fully functional EMS does not guarantee 100 percent compliance with environmental requirements, an EMS can provide approaches, context, and structure to facilitate identifying problems and potential problems and addressing them in a timely manner. Several survey findings indicate that respondents consider the EMS such a tool. First, the majority of responses identified environmental audit programs, corporate policies, goals, targets, and guidelines, and Responsible



The majority (71%) of actions taken in response to noncompliance are considered relevant to an EMS

Care® as management methods that have a strong influence on environmental performance. Second, 71 percent of respondents took EMS-related actions to prevent recurrence of noncompliance. For example, the most common actions taken—changes in procedures and policies—are viewed almost universally as integral parts of any EMS. Finally, several of the types of causes identified by respondents suggest a strong relationship between compliance and the existence of an EMS. For example, the root (***human error*** and ***procedures***) and contributing (***management***, ***procedures***, and ***compliance monitoring***) causes for noncompliance events identified by most respondents are linked directly to fundamental concepts of an EMS, such as commitment on the part of management, clearly communicated procedures, and auditing.

Among respondents, 41 percent stated that Responsible Care® or another EMS would have contributed to the prevention of the noncompliance.

The important relationship between EMSs and compliance is supported further by the finding that 41 percent of the respondents stated that Responsible Care® or another EMS would have contributed to the prevention of the noncompliance. Those respondents typically had implemented EMS activities, such as employee training, clarification of facility procedures, and modification of facility auditing practices, in response to noncompliances events. Although the remaining 59 percent of respondents stated that Responsible Care® or another EMS would not have contributed to the prevention of the noncompliance, 79 percent of these respondents also identified actions intended to prevent recurrence of the noncompliance that are relevant to an EMS. The responses suggest that EMSs may play a larger role in preventing noncompliance than some respondents indicated.

Would Responsible Care® or another EMS—if implemented before the occurrence of the noncompliance—have contributed to prevention of the incident?

Some respondents stated:

"A review of cause of exceedances would have given a better understanding and possible quicker solution to identify remedies."

"The existence of an EMS would have made facility personnel aware of the program requirements and the incident would not have occurred."

"The formal structure of the management systems implemented to meet Responsible Care® commitments would have increased the probability of clear communication of requirements, and the likelihood that internal compliance reviews would have identified remaining weaknesses for self-correction prior to the EPA inspection."

"A better system would have been in place to assure compliance with all permitting requirements rather than relying on one person."

Chapter 4

Respondents' Perspectives on Improving Compliance

Chapter Highlights

Respondents perspectives on traditional and innovative approaches to improving compliance include:

- Respondents identified increased employee involvement, improvement of the facility's management system, more clearly defined commitment on the part of management, and improved understanding of regulations as the most effective actions industry could take to improve compliance.
- Respondents identified tools developed by the facility, facility employees and corporate staff, and trade associations as the most useful sources of compliance assistance, indicating the industry's historical reliance on in-house support.
- Respondents recommended that government work with industry to provide more technical assistance, including guidance, documents, self-audit check lists, logic or applicability flowcharts, and workshops—ideally for each new rule.
- Respondents recommended a range of policy and regulatory changes, including the development of "plain language" rules, pilot testing of new rules, consolidation of overlapping regulatory requirements, and reduction of record keeping and reporting requirements.
- Respondents suggested that self-audits, third-party audits, EMS audits, or other forms of self-monitoring, potentially coupled with penalty relief, be used as alternatives to traditional compliance inspections.
- Among the respondents, 50 percent suggested that EPA reduce the frequency of compliance inspections for facilities that have good compliance records.
- Among the respondents, 66 percent participate in federal or state voluntary programs; respondents believe that these programs primarily focus on pollution prevention and that participation in them does not necessarily improve compliance.

Discussion

The survey asked questions about traditional and innovative approaches to improve compliance. The first section below focuses on respondents' perspectives on compliance assistance activities and regulatory changes that could improve compliance. The majority of those responses focus on EPA-related activities. This chapter also includes additional ideas about improving environmental compliance identified by individual members of the project team. The second section summarizes respondents' views on a range of topics related to compliance and enforcement activities, including:

- Industry actions for improving compliance
- Compliance assistance sources
- Alternatives to traditional compliance inspections
- Incentives that reward compliance
- Effect of voluntary programs on improving compliance

Recommendations and Ideas for Compliance Assistance and Regulatory Change

The respondents' recommendations were grouped in four categories, according to the subject of the change recommended:

- Compliance assistance activities
- Changes in EPA policy
- Regulatory changes
- Statutory changes

The categories were divided further according to the applicable statute. The respondents' recommendations and project team members' ideas that can be applied under any statute are provided below. Appendix F presents respondents' recommendations relevant to specific statutes.

Compliance Assistance Activities

Respondents suggested that EPA undertake the following compliance assistance activities for all applicable environmental statutes:

- Provide technical assistance in meeting the requirements of existing and new regulations. Specific examples of technical assistance suggested include guidance documents, regulation-specific self-audit check lists, logic guides, applicability flow charts, seminars or workshops, and on-site compliance or technical assistance.

In addition, individual members of the project team presented the following ideas:

- Develop industry-sponsored training on "how chemical plants

work" for staff of regulatory agencies (for example, rule writers and inspectors).

- Develop an industry-EPA personnel exchange program.
- Develop an inspection program under which technical assistance inspections are conducted routinely in advance of traditional enforcement inspections, particularly in the case of new rules.

Changes in EPA Policy

Respondents suggested the following changes in EPA policy:

- Issue compliance assistance tools with each new final rule.
- Modify EPA's audit policy to provide for immunity from penalties, rather than mitigation, for disclosures of noncompliance.
- Allow facilities a "grace period" for complying with new regulations.
- Designate a single EPA contact to work with each facility to coordinate EPA regulatory activities and provide assistance.
- Allow and encourage EPA inspectors to (1) provide technical assistance and (2) mitigate or omit penalties for noncompliance events that are addressed in a timely manner.
- Draft clear, "plain-English" rules and, as needed, include logic diagrams.
- Emphasize the collection of required information rather than enforcement activities in cases in which noncompliance events related to submittal of reports are discovered.
- Redirect inspectors from a focus on individual noncompliance events to a more comprehensive evaluation of the effectiveness of a facility's systems for protecting the environment.
- Improve coordination between EPA and states, particularly with regard to the interpretation of regulatory requirements.
- Increase the use of compliance assistance programs to help the regulated community understand and implement regulatory requirements.
- Create focus groups representing all stakeholders during early stages of revision of rules.

In addition, individual members of the project team presented the following ideas:

- Pilot-test a program similar to the Occupational Safety and Health Administration's (OSHA) "Nationwide Quick-Fix Program" (OSHA Instruction CPL 2.112, August 2, 1996), which offers reductions of penalties to employers that immediately abate hazards identified during an OSHA inspection.

- Provide compliance assistance to the regulated community and target compliance inspections on those facilities that do not request or participate in compliance assistance activities.
- Request that rule writers, rather than enforcement and compliance assistance staff, interpret rules.

Regulatory Changes

Respondents suggested the following changes in federal environmental regulations:

- Request that rules focus on performance rather than prescribed steps (that is, establish performance standards and allow industry the opportunity to meet the standards through adoption of those alternatives it chooses).
- Work with industry to pilot-test the feasibility of new rules before they are promulgated.
- Consolidate overlapping regulatory requirements.
- Reduce record keeping and reporting requirements.

In addition, individual members of the project team presented the following ideas:

- Incorporate all requirements in a single rule to minimize cross-referencing of requirements among rules
- Change permit modification procedures under the various federal environmental regulations so that the correction of errors in calculation is a minor modification (like the correction of typographical errors), rather than a major modification.

Other Compliance and Enforcement Perspectives

Respondents provided their views on a range of topics related to traditional and innovative compliance and enforcement activities.

Industry Actions for Improving Compliance

The survey asked respondents to rate 13 general actions industry could take according to their helpfulness in improving compliance. The four actions that were identified as most helpful to industry in improving compliance are:

- Increasing employee involvement
- Improving facility EMS
- More clearly defining management commitment
- Improving the understanding of regulations

These actions address functions important to EMS elements and validate industry's perspectives on the importance of EMSs. The "helpfulness scores" suggest that industry can improve compliance by strengthening, integrating, and linking EMS elements.

The table below presents "helpfulness scores" for all areas evaluated by the respondents.

Actions That Improve Compliance	Helpfulness Score[1] Scale: 10 = Most Helpful 1 = Least Helpful
Increased employee involvement	7.3
Improved facility management system	7.2
More clearly defined management commitment	6.9
Improved understanding of the regulations	6.8
Improved tracking system	6.7
Increased facility management involvement	6.4
Improved intrafacility communication	6.3
Improved record keeping procedures	6.2
More clearly defined responsibilities	6.2
Improved corporate/facility communication	5.3
More modern equipment	5.3
Increased number of employees	4.9
Improved access to EPA technical experts	4.7

[1] *Average helpfulness score*

Compliance Assistance Sources

The survey asked respondents to rate for usefulness, on a scale 1 to 5, 15 types of compliance assistance sources that the facility has used. The three sources most frequently identified are:

- Tools developed by the facility
- Facility employees (including corporate staff)
- Trade associations

Respondents identified tools developed by industry as the most useful sources of compliance assistance.

The identification of the above sources indicates that facilities favor materials developed by industry. This finding is supported by responses that stated that lessons learned from noncompliance events typically are shared with sister facilities, corporate offices, and trade associations, thereby enabling those organizations to provide effective compliance assistance to one another.

The least useful sources identified by respondents were universities and vendors, perhaps because such organizations typically do not provide compliance assistance to large facilities. Industry uses those resources for other purposes, such as obtaining information about pollution prevention. Assistance from federal employees also received relatively low scores for usefulness. The desire to protect

anonymity may limit industry's reliance on EPA for compliance assistance. The low rating of EPA also may reflect the relatively short time that EPA has been providing active compliance assistance. Similarly, the relatively low ratings assigned to state compliance assistance organizations and the Internet may derive in part from the relative novelty of those sources. In addition, state compliance assistance programs tend to focus on small businesses, while 81 percent of the facilities participating in the project have more than 100 employees.

The table below summarizes the ratings respondents assigned to various compliance assistance sources.

Source of Compliance Assistance	Usefulness Score[1] Scale: 5 = Very Useful 1 = Not Very Useful
Tools developed by the facility	4.1
Facility employees (including corporate staff)	4.0
Trade associations	3.8
Other facilities	3.6
Conferences	3.6
Consultants	3.6
Agency hotlines	3.4
Federal publications	3.4
State publications[2]	3.4
Internet	3.3
State employees	3.2
State compliance assistance organizations	3.0
Federal employees[2]	2.8
Vendors and suppliers[2]	2.6
Universities[2]	2.2

[1] *Average usefulness score*

[2] *Fewer than 20 respondents scored this source*

Alternatives to Traditional Compliance Inspections

The survey asked what industry evaluation methods could be used as substitutes for traditional compliance inspections. Approximately 60 percent of respondents answered the question. Almost all suggested alternatives involving self-audits, third-party audits, EMS audits, or other forms of self-monitoring to verify compliance. The relative uniformity of the responses may have been a result of the wording of the survey question, which offered "compliance or EMS audits" as examples. Nevertheless, many respondents qualified their answers. One respondent suggested that EPA inspectors visit the facility

Respondents suggested that self-audits, third-party audits, EMS audits, or other forms of self-monitoring be used as alternatives to traditional compliance inspections.

within a reasonable time after the self-audit report is submitted to verify that any deficiencies have been corrected. Another respondent suggested that companies that have third-party audit programs undergo formal inspection by EPA less frequently than those that do not have such programs. Three respondents stated that recognition by EPA of auditing programs should be accompanied by elimination of penalties for identified and corrected violations; two stated further that corrections should be made within a reasonable period of time or "grace period." Those responses, and similar responses to other questions, suggest a view that EPA's current audit policy does not grant adequate relief from penalties.

Incentives That Reward Compliance

The survey asked what incentives EPA could use to acknowledge or reward sustained compliance. No detailed responses were provided. However, respondents suggested four categories of incentives:

- Reduce the frequency of inspections
- Reduce or eliminate penalties for deficiencies identified during self-audits
- Provide public recognition
- Pursue "fast track" environmental permitting

Approximately 50 percent of respondents suggested that EPA reduce the frequency of compliance inspections for facilities that have good compliance records.

Effect of Voluntary Programs on Improving Compliance

The survey asked whether a facility was participating in a state or federal voluntary program. If so, the respondent was asked to characterize the program's effect on compliance. Two-thirds (66%) of respondents stated that their facilities were involved in federal or state voluntary programs. Examples of federal voluntary programs mentioned by respondents are EPA's 33/50 Program, Project XL, Climate Wise, and Green Lights. Examples of state voluntary programs are the Louisiana Environmental Leadership Program and Clean Texas 2000. Respondents representing facilities involved in such a program generally said the program had no effect on compliance or did not comment on the program's effect. Two notable exceptions were the OSHA Star program, which was commended by one respondent for its positive effect on compliance. A second comment concerned the Consolidated Fugitive Monitoring Rule established by the Louisiana Department of Environmental Quality and EPA Region 6; the respondent stated, "With multiple fugitive monitoring regulations to comply with, this program allows the facility to comply with the reporting and record keeping requirements of the most stringent fugitive monitoring programs."

Respondents participating in federal or state voluntary programs do not believe that participation in those programs improves compliance.

One reason some respondents believe that voluntary programs do not help improve compliance is that most voluntary programs focus on pollution prevention, rather than specific compliance issues. Participation in such a program does not necessarily change a facility's compliance obligations, although it could (for example, in a case in which a facility reduced its use or emissions of a substance to the point that it fell below the applicability threshold of a rule). Many respondents representing facilities that were not involved in voluntary programs stated that all their limited environmental management resources are required to attain and maintain compliance.

WWW Site

More information about EPA's voluntary programs is available on the Internet at:

<http://www.epa.gov/epahome/industry.htm>

Chapter 5

RECOMMENDATIONS

Chapter Highlights

Industry should consider the following actions to improve compliance through enhancements of EMSs:

- Ensure that all EMS elements are in place and all employees understand that the elements are part of the facility's EMS.
- Implement a program that promotes high levels of awareness of and commitment to the EMS among employees at all levels.
- Increase awareness among management and employees of the central role that a comprehensive EMS can play in achieving and maintaining compliance.
- Focus efforts on identifying more opportunities for rigorous implementation and evaluation of EMSs.
- Establish accurate, standard operating procedures that all affected employees can understand.
- Train employees to ensure that new and modified operating procedures are implemented properly.
- Conduct root cause analyses focused on an exhaustive and diligent identification of all causes of noncompliance to properly identify long-term solutions.

EPA should consider the following actions to promote compliance with regulations:

- Articulate new regulations more clearly.
- Work with state agencies to ensure that regulations are interpreted consistently.
- Continue compliance assistance and outreach activities.
- Consider the development of compliance assistance tools, such as plain-English guides for every new rule.
- Provide more incentives for industry to disclose violations.

Individually, and working together, EPA and various industry sectors should pursue additional root cause analyses of noncompliance to better understand the findings and recommendations discussed in this report. Such analyses might focus on:

- Understanding why and in what situations violations occur at facilities with EMSs.
- Looking more carefully at the "human error" category of causes used in this report.
- Involving, at the design stage of the analysis, a statistician and social psychologist.
- Studying noncompliance at small (less than 100 employees) companies.
- Conducting more research through discussions between EPA and industry to more fully understand the relationship between particular violations and appropriate corrective actions.

Discussion

This chapter presents recommendations for EPA and industry to consider that may lead to improved compliance with environmental regulations. The recommendations are based on: (1) observations about root causes and actions taken in response to noncompliance events, as presented in Chapter 2; (2) trends in noncompliance related to specific statutes, as described in Appendix D; (3) industry perspectives on improving compliance, as presented in Chapter 4; (4) observations regarding EMS related actions taken to return to compliance, as presented in Chapter 3; and (5) survey responses related to beneficial effects of the establishment and maintenance of EMSs on environmental performance, as presented in Chapter 3.

Recommendations included in the first section of this chapter generally focus on EMS improvements. Recommendations for EPA and industry to promote compliance, both generally and in connection with particular statutes, also are provided.

Strengthen Awareness and Implementation of EMSs

Recommendations provided in this chapter are based on survey findings indicating that EMSs play a larger role in improving compliance than often is recognized. Survey responses also indicate that further integration of EMS elements into an EMS framework should result in improved compliance. For example, one respondent stated: "The formal structure of the management systems implemented to meet Responsible Care® commitments would have increased the probability of clear communication of requirements, and the likelihood that internal compliance reviews would have identified remaining weaknesses for self-correction prior to the EPA inspection." Recognizing that EMSs are a tool to improve compliance is a first step toward improving compliance. Development and maintenance of a comprehensive, well-integrated and clearly articulated system should contribute significantly to improvements in compliance as sought by industry and regulators.

All employees should be aware of and committed to the facility's EMS.

A key method of ensuring that an EMS is viewed consistently and integrated into the daily operation of the facility is to encourage a high degree of awareness of it and commitment to it among all employees. Awareness and commitment can be achieved, in part, by clearly conveying top management commitment to environmental performance including compliance, by improving communication between management and employees and by appropriately dividing responsibility among environmental professionals and those with day-to-day operating responsibilities. Although maintaining effective communication and identifying clearly defined responsibilities can be challenging, a fully functional EMS appears to be an effective way to facilitate long-term compliance.

Increased awareness of the relationship between compliance and the EMS will fortify efforts to sustain a comprehensive, integrated EMS.

Increased awareness of the relationships between compliance and the EMS will fortify efforts to sustain a comprehensive, integrated EMS. To promote long-term compliance, industry should focus efforts on identifying opportunities for more rigorous implementation and evaluation of EMSs.

Considering the findings of the survey related to EMSs, further inquiry into the benefits of implementing EMSs is warranted. One possible follow-up investigation could focus on the 41 percent of respondents who stated that an EMS would have helped prevent the noncompliance event. Those respondents could be asked to provide additional information about how their facilities' EMSs help maintain compliance. Certain EMSs also could be used as case studies to help those facilities that do not have a fully functional integrated EMS.

Improve or Create Procedures Reinforced by Training

Human error and ***procedures*** were frequently identified as root causes. In many cases, both causes were identified for individual noncompliance events. Specifically, respondents identified *failure to follow operating procedures* as a root cause of many noncompliance events, especially those occurring under the CAA, CERCLA, the CWA, and RCRA. ***Human error*** and ***procedures*** often were identified as the root causes of noncompliance events related to reporting, operation and maintenance, and record keeping. Reporting, operation and maintenance, and record keeping typically are process-oriented activities that require step-by-step instructions or clearly articulated procedures. Therefore, establishing accurate, standard operating procedures that can be easily understood by employees may help reduce the frequency of occurrence of noncompliance events caused by ***human error*** or ***procedures.***

Employees should be trained to ensure that new and modified operating procedures are properly implemented.

Operating procedures that can be understood by all affected employees should be established.

Changes in procedures alone, however, may not fully address the causes of noncompliance. The actions taken in response to noncompliance identified in survey responses indicate the importance of training for properly implementing new or modified procedures. Training was identified as the third most frequently taken action (12%) in response to noncompliance events.

Employee training, awareness, and competency are important elements of any EMS. Because training was not identified frequently as a root or contributing cause, respondents may not have considered their training program a problem related to their EMSs. Facilities should reconsider the extent to which training is integrated into their EMSs. Doing so involves two steps. First, everyone in an organization should be trained in environmental responsibilities, tailored to the nature and extent of the potential environmental impacts of the employee's job. Second, the organization should document that all employees have received the type and level of environmental training appropriate for their jobs. The knowledge, skills, and abilities (competencies) needed to understand environmental impacts and regulatory requirements must be identified and developed. Finally, facilities should work with contractors who share their commitment to fully functional EMSs.

Promote and Encourage Root Cause Analyses

The information and ideas gained from the partnership between EPA and industry to study the effect of root cause analysis on compliance provide new opportunities to improve compliance. Through such efforts, EPA and industry have acquired unique perspectives on how environmental regulations are understood and implemented at individual facilities. Equipped with such knowledge, EPA can continue to improve the effectiveness of its regulatory programs and compliance assistance efforts. Industry, for its part, can review its resource allocations to address root causes of noncompliance, thereby improving return on environmental spending. Working together, EPA and industry can pursue additional root cause analyses of noncompliance to support improved environmental performance, including compliance with environmental requirements.

Root cause analyses should focus on an exhaustive and diligent identification of all causal factors to properly identify long-term solutions.

An important consideration in using root cause analyses to improve compliance is to identify all causes related to an incident of noncompliance. Identifying a single cause without evaluating all potential causes of the noncompliance may lead a facility to adopt an ineffective solution. In most (94%) cases, several causes were identified for an incident of noncompliance. For example, when ***regulations and permits*** was identified as a root cause of noncompliance, it typically was associated with other causes such as ***human error***, ***management***, and ***procedures***. The likelihood is great that any given noncompliance event has more than one cause. The accurate identification of all causes of noncompliance is essential to identifying and implementing long-term corrective measures.

When conducting root cause analyses, it is important to distinguish between what first may appear to be the cause of noncompliance from the true root cause(s) of the noncompliance. For example, 71 percent of the survey respondents that identified ***human error*** as a root cause of a noncompliance event implemented modifications of their existing procedures to prevent recurrence of the noncompliance. However, 90 percent of these respondents did not identify ***procedures*** as a root cause of the noncompliance event. This survey finding indicates that unclear or outdated procedures, rather than ***human error***, may have been a root cause. (Alternatively, the facility may have revised the relevant procedures simply for lack of any other concrete action to take, to avoid the appearance of not taking any action.) Addressing an apparent cause of noncompliance may not provide long-term solutions to noncompliance. Any application of root cause analysis should focus on an exhaustive and diligent identification of the true causal factors that should yield long-term solutions.

Outreach Through the Internet

ChemAlliance

EPA has funded a compliance assistance center for the chemical industry called ChemAlliance. The goal of ChemAlliance is to provide industry with easy access to EPA's regulatory information and a compliance assistance network. ChemAlliance promotes the exchange of information and technology transfer among its users. Available through ChemAlliance are examples of EPA's efforts to improve compliance and environmental performance, including:

- Compliance Improvement Tool (CIT): This tool provides an annotated list of compliance assistance resources applicable to the chemical industry sector.
- Inspection Tool for the Hazardous Organic NESHAP (HON): Volume I - Overview of Emission Points, Control Technology and HON Provision: This tool identifies sources of hazardous organic emissions regulated under the Clean Air Act (CAA) NESHAP requirements.
- Process-Based Self Assessment Tool for the Organic Chemical Industry: This tool provides guidance on performing multi-statute self-assessments to detect and correct noncompliances.
- Unified Air Toxics Website (UATW): EPA Rules & Implementation Information Pages: More than a hundred different air toxics related rule information pages have been developed.

ChemAlliance provides information through the World Wide Web site:

<http://www.chemalliance.org/>

CMA Outreach

CMA
COMPLIANCE ASSISTANCE TOOLS

In September 1995, CMA instituted a compliance assistance program to develop tools to assist its members in complying with federal regulations. Each compliance package includes a guidance document, training materials, and a self-assessment check list. Other trade associations may collaborate on the tools. The relevant regulatory agency typically reviews the tools in draft, and in some cases has co-issued them. Under the program, compliance packages have been developed on such rules as:

- Resource Conservation and Recovery Act (RCRA) Subpart CC
- CAA 112(r) Risk Management Plan
- The Hazardous Organic NESHAP (HON)
- Industrial Process Refrigeration Leak Repair
- U.S. Department of Transportation's (DOT) Pipeline Rules
- Occupational Safety and Health Administration's Respiratory Protection Standard

Weekly compliance alerts on final agency actions and a quarterly calendar of compliance deadlines also are available through a subscription service called the Regulatory Monitoring Service. Other services include a monthly poster series and periodic workshops.

More information is available from CMA's Web site at:

<http://www.cmahq.com/cmawebsite.nsf/pages/compliance>

EPA and industry may consider focusing future root cause analyses on:

- Understanding why violations occur at facilities with EMSs.
- Looking more carefully at the "human error" category of causes, as defined in this report, to distinguish between the causes within the human error category and other causes that may better address why the noncompliance occurred.
- Involving, at the design stage of the analyses, a statistician and social psychologist to address group factors, norms, and cultures in the analyses.
- Studying noncompliance at small (less than 100 employees) companies to better provide compliance assistance to small companies.
- Conducting more research through focus groups, or on a disclosed basis, so that EPA and industry can more fully understand the relationship between particular violations and appropriate corrective actions.

Streamline Regulations and Create Compliance Assistance Tools

Respondents frequently identified *lack of facility awareness of regulation applicability* and *inconsistent, contradictory, or ambiguous federal and state regulations* as root causes. The frequent identification of these causes, all categorized as ***regulations and permits***, was echoed by respondents' recommendations about regulatory changes that would improve compliance (see Chapter 4). Those recommendations were based on respondents' experiences trying to comply with federal and state requirements. This finding suggests two things. First, that new regulations should be articulated more clearly and that federal and state agencies should interpret regulations consistently. Second, federal and state agencies should continue developing easily understood assistance tools that will help the regulated community. As discussed in Chapter 4, a compliance assistance idea and policy change respondents frequently identified was the need for technical assistance in complying with new and existing regulations, as well as publication of these tools with every new rule. Specific compliance assistance tools suggested by respondents include guidance and self-assessment documents, logic guides, applicability notices, and seminars and workshops.

EPA should articulate new regulations more clearly.

EPA can enhance outreach activities related to the applicability of new regulations, in concert with industry and trade associations. Suggestions for improving compliance and environmental performance activities include:

EPA should continue compliance assistance and outreach activities.

- Continue developing standard federal and state interpretations of regulations.
- Continue developing plain-language guides.[4]
- Continue developing compliance assistance tools in cooperation with trade associations.
- Continue working with industry in developing new regulations and in improving existing regulations.

[4] *On June 1, 1998, President Clinton signed a memorandum directing all federal agencies to write regulations and other public communications in plain language. In response to this memorandum, EPA will write all proposed and final rules in plain language. Existing rules will be rewritten in plain language as EPA has "the opportunity and resources to do so."*

- Improve notifications and outreach through Internet mailing lists or other communication channels to inform industry about the available compliance assistance tools.

Statute-Specific Recommendations

The project team identified patterns of noncompliance under specific statutes and, in some cases, under several statutes. The table below identifies categories of noncompliance associated with the statute(s) and ways in which industry and EPA might help improve compliance and environmental performance. Many of the following recommendations can be integrated into an EMS to address the noncompliance categories identified. (Appendix F presents recommendations related to specific statutes provided by respondents, but not necessarily related to their noncompliance events.)

Statute	Frequently Identified Noncompliance Categories	Ideas for Improving Compliance	Lead Responsibility
CAA	Operations and Maintenance Monitoring/ Detection/ Control Record Keeping Report Submissions and Reporting	Develop technical guides for operation and maintenance of equipment and training for operation of equipment and update them regularly.	Industry
		Work with vendors to operate new equipment properly at startup.	Industry
		Designate facility staff who routinely review and assess the applicability of all new rules.	Industry
		Provide training for employees and contractors in meeting record-keeping requirements.	Industry
		Develop written procedures for record keeping and submittal of reports and update them regularly.	Industry
		Develop plain-language electronic guidance and compliance tools for meeting reporting requirements. Such tools could include on-line decision trees (the user enters process, units, and chemicals used) to guide users through determination of the applicability of regulations and their associated compliance deadlines and reporting requirements. The guidance would assist the user in completing the applicable reporting form(s) electronically once the decision tree has been completed.[1]	EPA and/or CMA
		Develop tools to better explain the applicability of rules and identify upcoming compliance dates (reminders of compliance deadlines).	EPA

[1] *OSHA has developed several interactive expert systems that could be used as models for such tools.*

Statute	Frequently Identified Noncompliance Categories	Ideas for Improving Compliance	Lead Responsibility
CWA	Exceedance	Develop new or modify existing procedures for the operation and maintenance and testing of new or modified equipment and update those procedures regularly.	Industry
		Train employees and contractors in how to implement new or modified procedures.	Industry
		Implement procedures that direct managers to spot-check operators' implementation of procedures.	Industry
		Conduct periodic testing of equipment to evaluate the remaining lifetime of equipment and to maintain its proper functioning and performance (ensure that permit limits are being met). When issues related to permit limits arise, determine the appropriate limit and work with the regulatory agency to establish permit modifications.	Industry
		Train employees and contractors on reporting and notification requirements.	Industry
		Develop training and written procedures for meeting record-keeping requirements.	Industry
		Improve procedures for use of contractors and purchase of materials, equipment, and other services.	Industry
		Develop a computerized alert or "tickler" system for reporting and notification.	EPA and/or CMA
		Develop self-audit check lists or plain-language guidance for all requirements that govern categorical dischargers, including those for permitting, limits on effluents, and those governing application of best control technology (BCT) and best available technology (BAT) for wastewater treatment.	EPA and/or CMA

Statute	Frequently Identified Noncompliance Categories	Ideas for Improving Compliance	Lead Responsibility
RCRA	Waste Identification Record Keeping Testing Unpermitted/ Unauthorized Activity	Provide training for employees and contractors in management of underground storage tanks (UST) and aboveground storage tanks (AST).	Industry
		Improve procedures for use and purchase of materials, equipment, and services.	Industry
		Provide training for employees and contractors in meeting record-keeping requirements.	Industry
		Develop plain-language electronic guidance and compliance tools for meeting reporting requirements. Such tools could include on-line decision trees (the user enters waste-type or facility specific information) to guide users through determination of the applicability of regulations and their associated compliance deadlines and reporting requirements. The guidance would assist the user in completing the applicable reporting form(s) electronically once the decision tree has been completed.	EPA and/or CMA
		Develop self-audit check lists for management of ASTs and USTs under 40 CFR 280, 265, and 264 subpart J.	EPA and/or CMA
EPCRA TSCA CERCLA	Report Submissions and Reporting	Provide written procedures and training for emergency reporting and notification requirements and update the procedures regularly.	Industry
		Develop plain-language electronic guidance and compliance tools for meeting reporting requirements. Such tools could include on-line decision trees (the user enters chemical and facility specific information) to guide users through determination of the applicability of regulations and their associated compliance deadlines and reporting requirements. The guidance would assist the user in completing the applicable reporting form(s) electronically once the decision tree has been completed.	EPA and/or CMA

Promote and Improve Self-Audit Incentives for Sustained Compliance

The option to conduct self-audits and report the results to EPA and state agencies may be a powerful incentive for facilities to demonstrate sustained compliance. Respondents expressed considerable interest in self-audits, both as an alternative to traditional compliance inspections and as a "reward" for sustained compliance. Some respondents' primary concern related to self-audits is whether penalties will be imposed for self-reported deficiencies.

EPA should provide more incentives for industry to disclose violations.

EPA continues to explore programs for recognizing companies or facilities that have strong histories of compliance.

Self-Reporting Incentives

OECA's Audit Policy

EPA addresses industry self-audits and disclosure in its policy statement Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations (60 F.R. 66705-66712, December 22, 1995). The policy reduces or, in some cases, eliminates penalties for companies that voluntarily discover, promptly disclose, and expeditiously correct violations. Under EPA's audit policy, through March 1998, 274 companies had submitted audit policy disclosures for more than 966 facilities. The gravity-based penalty was mitigated for disclosures submitted by 105 companies for 452 facilities. Action on disclosures submitted by 116 companies for 451 facilities currently is unresolved. EPA encourages facilities to self-audit and disclose findings. EPA also continues to evaluate the effectiveness of its audit policy.

More information about the audit policy is available at:

<http://www.epa.gov/oeca/auditpol.html>

Small Business Policy

EPA's Small Business Policy was developed to help small businesses that have 100 or fewer employees achieve environmental compliance by creating benefits for businesses that make a good faith effort to comply with environmental regulations before a government agency discovers a violation or otherwise takes an enforcement action.

The policy provides incentives, such as waivers or reductions of penalties, for businesses that participate in on-site compliance assistance programs or conduct environmental audits to discover, disclose, and correct violations.

More information about the small business policy is available at:

<http://www.epa.gov/oeca/smbusi.html>

Appendix A

Responses to Survey Questions and Data Limitations

Responses to Survey Questions and Data Limitations

This appendix is made up of five sections, corresponding to the following sections of the Root Cause Analysis Pilot Project survey:

Section I - Demographic Information
Section II - Underlying and Contributing Causes
Section III - Response to the Noncompliance
Section IV - Environmental Management System Elements
Section V - Compliance and Enforcement Activities

Each question in the survey is reproduced here, and the number of responses received is presented below the appropriate question. When necessary, the type of response also is characterized (for example, the number of multiple answers provided by a single respondent). In total, 27 surveys were completed and returned.

In any survey, there are potential errors due to sampling and errors due to nonresponse. Since the study design used here is a census, there is no sampling error associated with the results. Since 23 of the 50 facilities in the study population did not respond, the potential for nonresponse error is large, especially so because, as noted above, the respondent facilities are clearly not representative of all 50. Let us illustrate these concepts with an example. Of the 69 noncompliance events in the sample, 7 (10%), were classified as exceedance, all of which involved discharge limits under the Clean Water Act. But there is no way of knowing what percentage of noncompliance events among the nonrespondents would be classified as exceedances, or under what statute they would be identified: it could be 0%, 10%, 50%, or any other percentage. Thus, one cannot say that 10% of noncompliance events in the whole study population are classified as exceedance, nor can one specify a meaningful range (confidence interval) for the percentage of exceedance noncompliance events in the study population.

Of the sixteen facilities with SIC code 2869 in the study population, fourteen were large (100 or more employees) and thirteen of these responded. Since this is essentially full response, the results of analysis for these facilities are representative for this study group. However, all of these facilities are in EPA Regions 2 and 6, so without further studies, one cannot conclude that these results extend beyond the study population.

Completed surveys were received in two forms: electronic and paper. All the paper surveys were converted to electronic format, so that the data could be analyzed. The electronic format of the survey limited respondents (in the case of certain questions) to specific responses; while the paper survey did not limit respondents. Therefore, when some paper surveys were transcribed into the electronic format, they were altered slightly. The intent of the respondent was retained as much as possible during that process.

For example, in Section III, question 4 asked whether the facility had made an inventory of past, current, or potential environmental impacts associated with its operations, services, and products. The respondent was asked to check either Yes or No, and, if Yes, to identify which (past, current, or potential) inventory they had conducted. The electronic survey allowed the respondent only to specify one type of inventory, while the paper version allowed the respondent to specify as many as three.

To reduce the burden on respondents, noncompliance categories were created to allow respondents to consolidate similar noncompliance events and answer questions about the types, rather than specific noncompliance events. This approach did not allow the direct correlation of responses to different portions of the survey. Specifically, responses to Section IV (changes in EMSs) could not be linked to responses to sections II and III (root and contributing causes of noncompliance and actions taken).

Survey for the
Root Cause Analysis Pilot Project

United States Environmental Protection Agency
and the
Chemical Manufacturers Association

Section I

1. Please provide the remaining numbers of the **primary** four-digit SIC code of the facility.

2	8		

All 27 respondents answered. One respondent provided two primary SIC codes, and another respondent listed a primary SIC code outside the 28 group.

2. How many employees were located at the facility at the time of the noncompliance?

   (Please check one box each for A and B.)

   A. Full-time employees

   ☐ 0-9 ☐ 10-49 ☐ 50-100 ☐ 101-500 ☐ More than 500

   B. Full-time contractors

   ☐ 0-9 ☐ 10-49 ☐ 50-100 ☐ 101-500 ☐ More than 500

   All 27 respondents answered both parts of this question.

3. What are the job responsibilities of the person(s) completing this survey?

   (Check all that apply.)

   ☐ Compliance Staff ☐ Operator ☐ Environmental Engineer

   ☐ Corporate Management ☐ Plant Management ☐ Engineer (non-environmental)

   ☐ Other (specify) _____

   All 27 respondents answered this question. The number of responses per survey varied; 14 surveys listed only 1 job responsibility, 8 surveys listed 2 job responsibilities, 3 surveys listed 3 job responsibilities, and 2 surveys listed 4 job responsibilities.

4. Identify the activities currently performed at the facility (for example, production, packaging, storage, and research and development).

   All 27 respondents answered this question.

5. How many years has the facility been in operation (as of today)?

   ☐ 1-5 ☐ 6-10 ☐ More than 10

   All 27 respondents answered this question.

Section I

6. Use a check (✓) in the correct column to indicate how long each EMS or policy has been in place at your facility. Of those checked, rank each based on the influence they have had on your overall environmental performance (1 = greatest, 8 = least).

Environmental Management System	Length of Time in Place (3)			Rank
	Less than 1 year	1-5 years	More than 5 years	
Responsible Care® Management Systems (check all that apply)				
Policy and Leadership		25		23
Planning		24		22
Implementation, Operation, and Accountability		25		23
Performance Measurement and Corrective Action		25		23
Management Review and Reporting		25		23
Corporate Policies, Goals, Targets, or Guidelines — for example, corporate audits (describe)				
Description		26		24
Other EMSs — for example, ISO14001, GEMI (describe)				
Description		7		7
Environmental Audit Program (describe)				
Description		23		22

The number in each column indicates the number of respondents who indicated that element.

Section II

List the two-character noncompliance code(s) identified for your facility. List all that apply.

All 27 surveys identified noncompliance codes. The number of noncompliance codes per survey varied:

10	*surveys identified only 1 noncompliance code*
7	*surveys identified 2 noncompliance codes*
4	*surveys identified 3 noncompliance codes*
3	*surveys identified 4 noncompliance codes*
2	*surveys identified 6 noncompliance codes*
1	*survey identified 9 noncompliance codes*
for a total of 69	*noncompliance codes*

Categories And Items	Underlying Cause	Contributing Cause
Human Error Policies Procedures Management Training Communications — Difficulties Between Emergency Preparedness Process Upset or Failure as a result of Compliance Monitoring Regulations and Permits External Circumstances Equipment Problems Other Categories or Items (specify)	*97 underlying, or root causes were identified by respondents.*	*127 contributing causes were identified by respondents.*

A complete listing of specific items is included in Appendix C.

Complete the following ONLY if you identified equipment problems as a cause.

Check (✓) the appropriate box in the left column to indicate the type of equipmnet involved and then draw a line to the item(s) in the right column that indicates the function(s) that was lost.

Type of Equipment:		Equipment function that was lost:
❑ Piping	•	• Containment
❑ Tanks, vessels, reactors	•	• Process control
❑ Pumps, compressors, blowers, turbines (rotating equipment)	•	• Active mitigation • Passive mitigation
❑ Motors	•	• Material transport
❑ Heat exchangers	•	• Other (specify) _____
❑ Control valves	•	
❑ Solids handling	•	
❑ Instrumentation	•	
❑ Other (specify)	•	

All 9 respondents who identified equipment problems as a cause responded to the equipment problems question above.

Section III

1. For each action taken, complete all columns.

List all actions the facility took to prevent recurrence of the noncompliance, including development or enhancements of EMSs.	List the associated two-character noncompliance codes.	Was the action taken? (Check one)		How did the facility verify that the action taken would ensure compliance? (For example, was the action verified through a self-assessment audit, root cause analysis, or EMS audit?)	Describe any lessons learned and with whom the facility shared those lessons—for example, sister facilities or trade associations.
		ST	LT		
a. *127*	*62*	*125*		*117*	*70*

26 respondents completed to this section; the 1 who that did not respond stated that the question was not applicable to the noncompliance in question, because the noncompliance occurred during closure, after all manufacturing operations had ceased. Respondents described a total of 127 actions for 62 of the 69 noncompliance codes identified in Section II. The number in each column indicates the number of responses to that element.

Section III

2. Which facility life cycle step(s) was the focus of re-engineering to reduce or eliminate the possibility of similar future incidents of noncompliance? Check the appropriate box in the left column to indicate the life cycle step and then draw a line to the item(s) in the right column that indicate the aspect(s) of the EMS that was (were) modified to avoid similar incidents.

Life Cycle Steps	Aspects of the EMS
❑ Research and Development ---------- •	*Operational Discipline*
❑ Design ---------- •	• Procedures
❑ Process Hazards Analysis ---------- •	• Training
❑ Fabrication ---------- •	• Demonstration of Performance
❑ Emergency Planning and Response ---------- •	• Documentation
❑ Pre-Startup Review ---------- •	• Other (specify) _____
❑ Startup ---------- •	*Checks and Balances*
❑ Operation ---------- •	• Quality Assurance/Quality Control
❑ Inspection and Testing ---------- •	• Handling of Deviations
❑ Maintenance ---------- •	• Mangement of Change
❑ Other (specify) ---------- •	• Other (specify) _____
	Feedback
	• Incident Reports
	• Audits
	• Performance Data (people, chemical process, or equipment)
	• Other (specify) _____

22 respondents answered this question.

3. Would Responsible Care® or another EMS—**if implemented before the occurrence of the noncompliance**—have contributed to prevention of the incident?

☐ YES ☐ NO Please comment on your answer.

26 respondents answered this question; 23 of the 26 provided comments.

4. Has the facility made an inventory of past, current, or potential environmental impacts associated with its operations, services, and products?

☐ NO ☐ YES If YES, which? ☐ Past
☐ Current
☐ Potential

If yes, how has an inventory of environmental impacts affected the facility's ability to manage compliance with environmental regulations?

22 respondents answered this question; all those who responded YES provided comments.

Section IV

To complete this section: **If more than one facility case-specific profile was provided, complete this section based on the status of your EMS at the time of the most recent enforcement action, as indicated by the "Commenced Date" on the facility case-specific profiles.**

COLUMN

A Was the element part of the facility's EMS at the time of the noncompliance? Check the appropriate YES or NO column for each element.

B Is the element currently part of the facility's EMS? Check the appropriate YES or NO column for each element.

C Does the facility consider the element part of Responsible Care® or another EMS to which the facility subscribes? Check the appropriate column for each element and indicate whether the element has been clarified (C), added (A), or not changed (NC) to prevent recurrence of the noncompliance.

26 respondents completed this section; the 1 who did not respond stated that the question was not applicable to the noncompliance in question, because the noncompliance occurred during closure, after all manufacturing operations had ceased. The number in each row indicates the number of responses to that element.

	A. Part of the facility's EMS at the time of the noncompliance?		B. Presently part of the facility's EMS?		C. Element is part of . . .	
					Responsible Care® (✓)	Another EMS (✓)
	YES (✓)	NO (✓)	YES (✓)	NO (✓)	To prevent recurrence of the noncompliance, this element was… C=Clarified A=Added NC=Not Changed	
1. Policy and Leadership						
A. The facility's goals and objectives statement includes an environmental policy statement.	*24*				*22*	
B. Top management defines environmental policy and sets goals and expectations regarding environmental performance.	*26*				*24*	
C. The philosophy of continuous improvement is integrated into the environmental policy.	*24*				*22*	
D. The environmental policy contains an explicit written commitment to regulatory compliance and pollution prevention.	*25*				*23*	

Section IV

	A. Part of the facility's EMS at the time of the noncompliance?		B. Presently part of the facility's EMS?		C. Element is part of . . .	
					Responsible Care® (✓)	Another EMS (✓)
	YES (✓)	NO (✓)	YES (✓)	NO (✓)	To prevent recurrence of the noncompliance, this element was… C=Clarified A=Added NC=Not Changed	
2. Planning						
A. Environmental planning is part of the budget and business development process.	*24*				*22*	
B. The planning process includes setting specific objectives and targets with time frames.	*24*				*22*	
3. Implementation, Operation, and Accountability						
A. Formal lines of authority and responsibility and accountability for environmental management have been established.	*25*				*23*	
B. Environmental managers have organizational stature, independence, and authority to implement environmental programs and to make decisions relating to environmental protection.	*26*				*23*	
C. Responsibility for environmental management is incorporated into personnel evaluations, rewards, and incentives.	*23*				*21*	
D. There is a system in place to review and update environmental procedures periodically.	*26*				*24*	
E. There is a system in place for tracking and interpreting new and/or changes to Federal, state, and local regulations and updating facility policies and directives for the organization's response.	*26*				*24*	
F. Responsibility and accountability for environmental performance are shared between staff employees and managers at all levels.	*24*				*22*	

	A. Part of the facility's EMS at the time of the noncompliance?		B. Presently part of the facility's EMS?		C. Element is part of . . .	
					Responsible Care® (✓)	Another EMS (✓)
	YES (✓)	NO (✓)	YES (✓)	NO (✓)	To prevent recurrence of the noncompliance, this element was… C=Clarified A=Added NC=Not Changed	
3. Implementation, Operation, and Accountability (continued)						
G. Staff are encouraged to communicate environmental issues and concerns directly with top management and/or environmental managers.	*26*				*24*	
H. There is a system in place to ensure that personnel with environmental responsibilities have the relevant background and training to carry out their responsibilities.	*26*				*24*	
I. There is a system in place to ensure that environmental reports required by Federal and state regulations are prepared routinely and submitted on a timely basis.	*26*				*23*	
J. Procedures are established to identify the potential for and response to emergency situations.	*26*				*24*	
4. Performance Measurement and Corrective Action						
A. The facility has developed and implemented a preventive maintenance program to ensure proper operation of pollution control equipment.	*24*				*22*	
B. Environmental compliance audits are conducted at least every three years.	*25*				*23*	
C. Audits are conducted by persons independent of the facility unit which is the subject of the compliance audit.	*23*				*22*	
D. Compliance audit results are reported directly to facility management.	*26*				*23*	

Section IV

	A. Part of the facility's EMS at the time of the noncompliance?		B. Presently part of the facility's EMS?		C. Element is part of . . .	
					Responsible Care® (✓)	Another EMS (✓)
	YES (✓)	NO (✓)	YES (✓)	NO (✓)	To prevent recurrence of the noncompliance, this element was… C=Clarified A=Added NC=Not Changed	
4. Performance Measurement and Corrective Action (continued)						
E. A formal system is in place for follow-up of exceptions noted in inspections or audits and supported by management review.	*24*				*22*	
F. Periodic environmental management system audits are conducted at the facility.	*22*				*20*	
G. The integrity and efficacy of the EMS are periodically reviewed and revisions are made based on the results of this review.	*16*				*16*	
H. The facility has developed a written description of the facility EMS that describes its organizational and functional structure and elements.	*19*				*18*	
I. The facility has designated a point-of-contact for records relating to the EMS.	*21*				*20*	

Section V

1. When an underlying cause(s) or contributing cause(s) was identified under Regulations and Permits in Section II, identify the specific regulatory provision or language pertinent to the noncompliance and the associated two-character noncompliance code. Please identify compliance assistance tools or regulatory reforms that would help your facility comply with the regulatory provision or language.

Regulatory Provision or Language	Compliance Assistance Tools or Regulatory Reforms
35	*29*

41 responses to this question were expected (because regulations and permits was identified as a root or contributing cause 41 times, by 20 respondents, in Section II). 35 of those responses were addressed by 19 respondents. However, several respondents identified more than one compliance assistance tool or regulatory reform for a noncompliance code:

1 respondent provided 3 responses for 1 noncompliance code
1 respondent provided 2 responses for 1 noncompliance code
24 respondents provided 1 response for 1 noncompliance code

In some cases, respondents indicated the same noncompliance code more than once under Regulations and Permits in Section II:

3 respondents indicated the same noncompliance code 2 times
1 respondent indicated the same noncompliance code 3 times
1 respondent indicated the same noncompliance code 5 times

In each case listed above, the respondent provided 1 response to this question.

The number in each box indicates the number of responses to that element.

Section V

2. List three other regulations for which compliance assistance could improve facility compliance. Identify the three regulations (not identified in your facility case-specific documents) and the noncompliance categories with which compliance is most difficult. Identify compliance assistance tools or regulatory reforms that would help your facility comply with the regulatory provision or language.

Regulatory Provision or Language	Compliance Assistance Tools or Regulatory Reforms
22	*22*

11 *respondents answered this question.*

5 *respondents provided 3 responses; 3 of those respondents specified 3 noncompliance codes, 1 of those respondents specified 2 noncompliance codes and did NOT specify a noncompliance code for one answer, and 1 of those respondents did NOT specify a noncompliance code for any answer*

1 *respondent provided 1 response; the respondent specified 1 noncompliance code and did NOT specify a noncompliance code for one answer*

5 *respondents provided 1 response and specified 1 noncompliance code*

3. Describe any other regulatory reform initiatives or opportunities that would enable the facility to comply more efficiently with environmental requirements.

14 respondents answered this question.

4. What industry evaluation methods (for example, compliance audits or EMS audits) could be used as substitutes for traditional compliance inspection, and how could facilities or government demonstrate the credibility of such evaluation methods to the public?

16 respondents answered this question.

5. What incentives could EPA use to acknowledge or reward sustained compliance?

21 respondents answered this question.

Section V

6. If a government compliance inspector provided compliance assistance, was that assistance effective?

   ☐ YES ☐ NO

   If YES, what did the inspector do and how was that assistance useful?

   _____

   If NO, how can EPA improve its efforts to provide such assistance?

   _____

   27 respondents answered this question; 15 of the 27 provided comments.

7. For the concluded action(s) summarized in the facility case-specific profile(s), could Supplemental Environmental Projects have been incorporated to provide more environmentally beneficial settlements? If so, please provide specific examples.

   _____

   17 respondents answered this question.

Section V

8. Check the appropriate YES or NO column to indicate the compliance assistance sources the facility has used. Indicate how useful you found each source by circling the appropriate number. If you did not use a source, indicate how useful you think it would be.

YES (✓)	NO (✓)	Compliance Assistance Sources	Not Very Useful Very Useful
		Agency hotlines	*23*
		Conferences	*26*
		Consultants	*26*
		Federal employees	*25*
		State employees	*26*
		Your facility's employees	*25*
		Internet	*23*
		Other facilities	*26*
		Federal publications	*25*
		State publications	*24*
		State compliance assistance organizations	*29*
		Tools developed by the facility	*24*
		Trade associations	*25*
		Universities	*20*
		Vendors and suppliers	*22*
		Other (specify) _____	*4*

26 respondents answered this question; the 1 who did not respond stated that the facility was closed and that the question was not applicable. The number of responses concerning the usefulness of each item varied; the number in each row indicates the number of responses to that element.

Section V

9. Does your facility participate in any state or Federal voluntary programs?

☐ YES ☐ NO

If YES, please identify the program(s) and explain its effect on compliance.

If NO, please explain why.

_____

27 respondents answered this question; 25 of the 27 provided comments.

10. On a scale of 1 to 10 (with 10 being the most assistance), rate each of the following areas for its helpfulness to your facility in improving compliance.

25	More clearly defined management commitment
23	Increased number of employees
26	Increased employee involvement
26	Increased facility management involvement
25	Improved access to EPA technical experts
25	Improved corporate/facility communication
24	Improved facility management system
25	Improved intra-facility communication
26	Improved record-keeping procedures
26	Improved tracking system
26	Improved understanding of the regulations
26	More clearly defined responsibilities
24	More modern equipment
0	Other (specify) _____

26 respondents answered this question; the 1 who did not respond stated that the facility was closed and that the question was not applicable. The number in each row indicates the number of responses to that element.

Appendix B

Definitions of Noncompliance Categories

Definitions of Noncompliance Categories

Corrective Action Activities

Although not necessarily a noncompliance with the regulations, this category addresses corrective action activities imposed by a legal agreement such as a § 3008(h) or § 3013 order.

Equipment/Unit Design

Noncompliance resulting from design deficiencies for structures, systems, or resources.

Exceedance

Failure to meet discharge limit(s) as defined in the facility permit or by regulation.

Failure to Respond

Failure to respond to an information request.

Labeling

General noncompliance with regulations requiring labeling and placarding.

Legal Agreement

Failure to correct a noncompliance in accordance with any agreement or to achieve a milestone per any agreement requirements.

Monitoring/Detection/Control

Failure to comply with monitoring, detection, or control requirements.

Operations and Maintenance

General noncompliance of an operational and maintenance nature such as: the use of defective containers; failure to close hazardous waste containers; lack of aisle space in storage areas; or failure to perform required equipment inspections, calibrations, and maintenance.

Record Keeping (incomplete or late)

Noncompliance concerning operating records or files, not maintained in accordance with regulations. This includes failure to maintain training records as required by regulation, and failure to file complete/accurate manifest reports.

Report Submissions and Reporting

General failures to submit required reports, or the submittal of incomplete/inaccurate reports, to the regulating agencies. Includes the failure to report spills or releases to the regulating agencies in a timely manner as defined by regulation.

Spills/Releases

Noncompliance relating to spills or releases.

Testing

Failure to perform sampling or analysis in accordance with prescribed procedures or permit criteria.

Training/Certification

Failure to train environmental personnel in the performance of their duties as specified by regulation (includes inadequate training, failure to conduct refresher training). This includes lack of training/certification records and failure to have certification training.

Unpermitted/Unauthorized Activity

Noncompliance resulting from unpermitted or unauthorized activities or equipment. Includes noncompliance with permit requirements and failure to obtain a permit/authorization.

Waste Identification

Failure to identify/characterize waste as required by regulation.

Appendix C

Root and Contributing Cause Categories and Specific Causes

Root and Contributing Cause Categories and Specific Causes

Human Error

1. Individual responsibility or professional judgment
2. Fatigue, lack of alertness, distraction
3. Inexperience, lack of knowledge, lack of technical expertise
4. Other (specify) _____

Policies

5. Unavailable policy
6. Unclear policy
7. Environmental objectives and targets unclear
8. Policy not followed
9. Pollution control technologies or other technical equipment needs not assessed
10. Other (specify) _____

Procedures

11. Operating procedure not followed
12. Operating procedure unclear or out of date
13. Difficult to relate operating procedures to actual facility operations and products
14. No written operating procedures available
15. Record keeping procedures inadequate
16. Definition of roles and responsibilities unclear
17. Reporting or notification procedures unclear
18. Pre-startup review not conducted or inadequate
19. Other (specify) _____

Management

20. No formal management structure to address noncompliance and follow-through
21. Management organization undefined
22. Management support or guidance not provided
23. Staffing — inappropriate level or expertise
24. Environmental aspects of facility process and operations not identified
25. Control and oversight of purchased materials, equipment, and services not provided or inadequate
26. Environmental planning or budgeting not completed
27. Result of economic competition
28. Other (specify) _____

Training

29. Employee not trained
30. Training materials unclear or outdated
31. Training not available
32. Training requirements unclear
33. Other (specify) _____

Communications — difficulties between

34. Employees
35. Management and employee
36. Facility and regulatory agencies
37. Other (specify) _____

Emergency Preparedness

38. Emergency Preparedness Plan unavailable
39. Emergency Preparedness Plan insufficient
40. Emergency Preparedness Plan implementation issues
41. Other (specify) _____

Process Upset or Failure as a result of

42. Over pressure
43. Over temperature
44. Runaway reaction
45. Raw material
46. Other (specify) _____

Compliance Monitoring

47. Audit program insufficient
48. Audit follow-up procedures insufficient
49. Routine site and equipment compliance checks not conducted
50. No system to ensure timely submission of environmental reports to regulatory agency
51. Insufficient environmental data
52. Other (specify) _____

Regulations and Permits

53. Conflicting permit conditions
54. Ambiguous Federal regulations
55. Ambiguous state regulations
56. Regulatory change not communicated by regulatory agency
57. Contradiction between state and Federal regulations
58. Inconsistent or contradictory Federal regulations
59. Inconsistent or contradictory state regulations
60. Inconsistent or contradictory interpretation of Federal regulations
61. Inconsistent or contradictory interpretation of state regulations
62. Facility unaware of applicability of a regulation
63. Rule implementation time frames are too short
64. Other (specify) _____

External Circumstances

65. An act outside the control of the individuals who operate the process
66. External phenomenon (for example, weather, theft, flood, fire)
67. Contracted services such as haulers or handlers
68. Other (specify) _____

Equipment Problems

69. Design or installation
70. Equipment maintenance
71. Ordinary wear-and-tear
72. Site and equipment inspections not conducted
73. Exceptions noted in inspections were not followed up
74. Other (specify) _____

Other Categories or Items (specify)

75. _____
76. _____
77. _____

Appendix D

Statutes

STATUTES

This appendix presents survey findings related to specific statutes. The relationships among individual statutes and noncompliance categories and the root and contributing causes are discussed below. In addition, the actions taken to address noncompliance events as they are related to each statute are discussed.

Noncompliance Events and Statutes

Most (72%) noncompliance events occurred under the Clean Water Act (CWA), the Resource Conservation and Recovery Act (RCRA), and the Clean Air Act (CAA). For each statute, the type of noncompliance events most frequently identified for each statute was:

- CWA - Exceedance
- RCRA - Unpermitted/unauthorized activity
- CAA - Operations and maintenance
- Toxic Substances Control Act (TSCA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Emergency Planning and Community Right-to-Know Act (EPCRA) - Report submissions and reporting

Most noncompliance events were associated with the CWA and RCRA; specifically, the CWA and RCRA were associated with 29% and 23%, respectively, of all types of noncompliance events.

Causes and Statutes

For each statute, the cause of a noncompliance event most frequently identified, characterized as a root or a contributing cause, was:

- CWA - ***Regulations and permits*** and ***procedures***, each identified with the same frequency
- RCRA and CERCLA - ***Human error***
- CAA and EPCRA - ***Regulations and permits***
- TSCA - ***Management***

Actions Taken

For each environmental statute, actions taken in response to noncompliance events were reviewed. (Respondents had described the actions taken by the facility in response to noncompliance events.) For all statutes except the CWA, most actions taken in response to noncompliance events were management or administrative in nature—that is, they pertained to policy, procedures, reporting, or training. In contrast, most actions taken in response to noncompliance events under the CWA were technical—for example, upgrades of treatment systems, modification or installation of equipment, or source reduction.

The following sections present the noncompliance events, root and contributing causes, and actions taken in response to noncompliance events for each statute. For each statute, two figures are presented. The first figure presents the noncompliance categories most frequently identified for the statute. The second figure presents the root and contributing causes most frequently identified.

Clean Water Act

The largest number of noncompliance events for the CWA involved exceedances and events related to requirements for report submissions and reporting.

Respondents identified the root and contributing causes of each noncompliance event. Under the CWA, the root causes most frequently identified were ***equipment problems***, ***external circumstances***, and ***human error***. Specific causes associated with the root causes included:

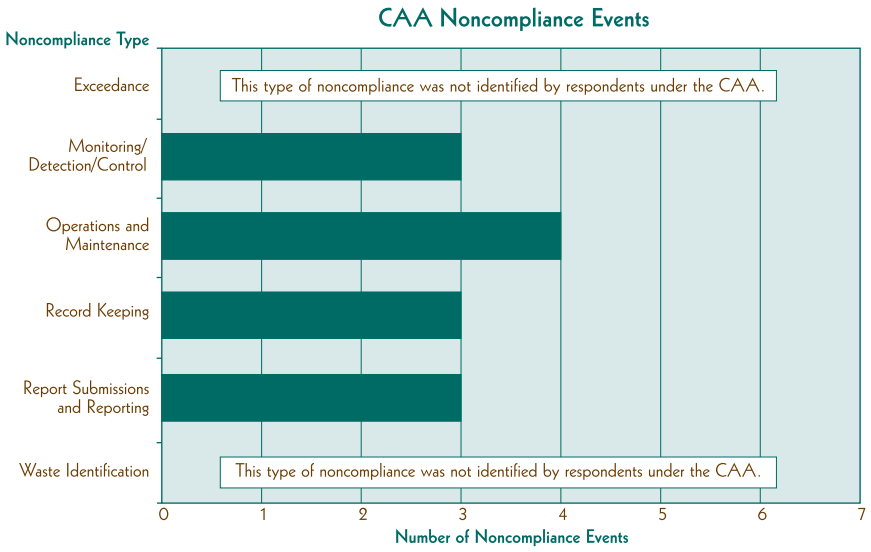
- ***Equipment problems:*** *design or installation, equipment maintenance, ordinary wear-and-tear*, and *premature failure of equipment operating within its design life*
- ***External circumstances:*** *external phenomenon (for example, weather or fire), contracted services*, and *site-wide power failure*
- ***Human error:*** *individual responsibility or professional judgment* and *inexperience, lack of knowledge, lack of technical expertise*

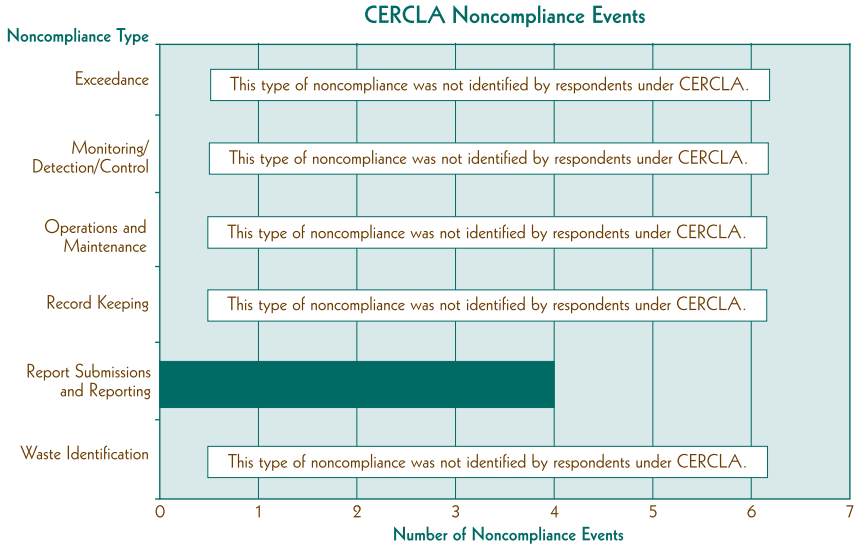
The contributing causes most frequently identified were ***procedures*** and ***regulations and permits***.

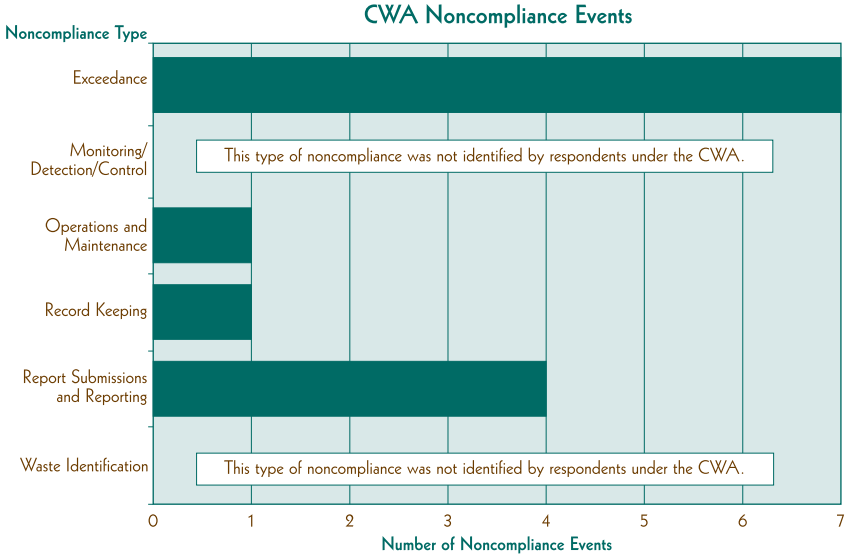
In contrast to all other statutes, most actions taken in response to noncompliance events under the CWA were technical in nature, and many of those actions were related to storm-water issues. Specific examples include: improvement of sewer integrity, source reduction of pollutants discharged to wastewater treatment, expansion or upgrades of wastewater treatment systems, design standards, installation of equipment, and changes in equipment design. Two facilities that had had CWA noncompliance events related to reporting instituted procedures involving outside laboratories: one established requirements that the laboratory provide early test results by facsimile and telephone for any results exceeding permit conditions; the other required that the laboratory perform monitoring.

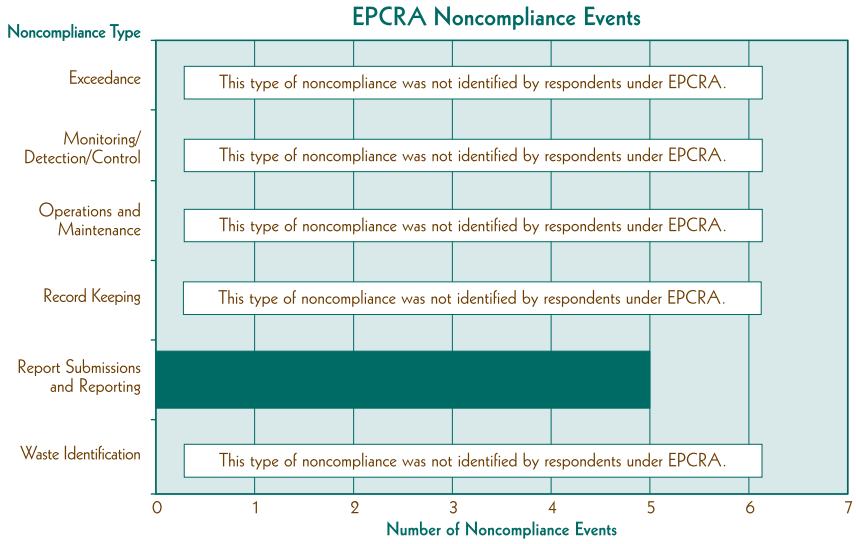
Management or administrative actions associated with technical actions addressed training of employees, analytical testing procedures, and monitoring procedures.

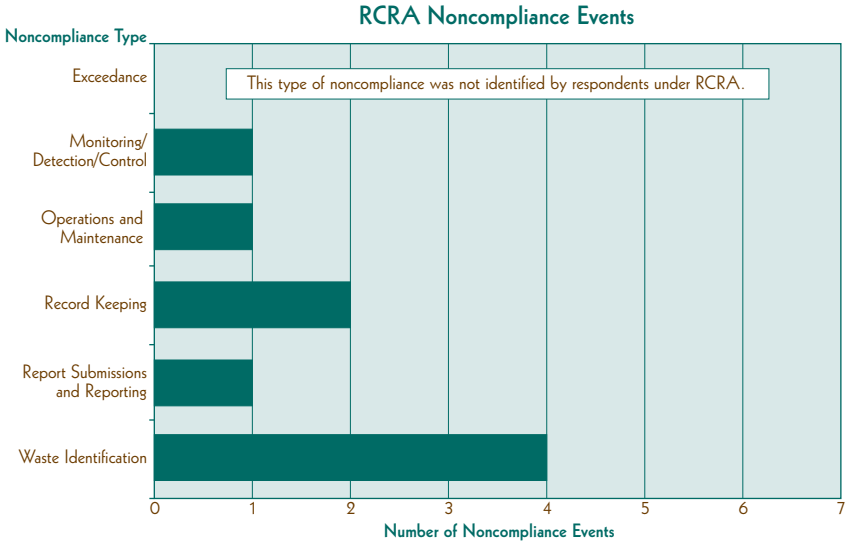
More than in the case of any other statute, noncompliance events under the CWA were associated with exceedances and reporting. This finding is consistent with the nature of regulations under the CWA, which focus on end-of-pipe discharge limits and reporting mechanisms for verifying that discharge limits are met. While most root causes identified for noncompliance events associated with the CWA were either technical (***equipment problems***) or accidental (***human error*** and ***external circumstances***), the ***procedures*** and ***regulations and permits*** categories stood out as the primary contributing causes. This finding is particularly noteworthy in light of actions taken in response to noncompliance events. Most actions taken addressed technical aspects of noncompliance (for example, equipment changes and operational refinements); however, relatively few actions taken addressed contributing causes that involved procedure failure or lack of understanding of regulations. Such contributing causes could be corrected by implementation of a formal environmental management system (EMS) that includes preventive actions and training to improve compliance, as well as by clarification of interpretation of regulations.

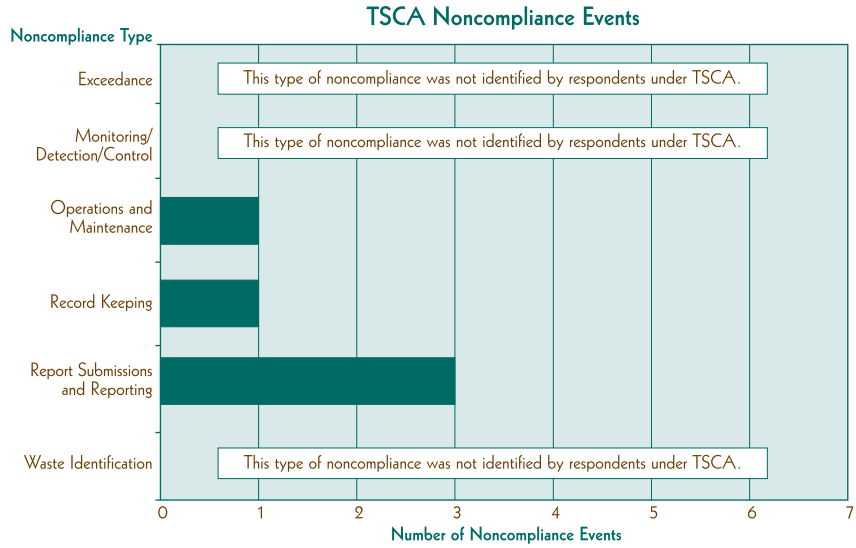

CAA Noncompliance Events
Noncompliance Type
Exceedance
This type of noncompliance was not identified by respondents under the CAA.
Monitoring/ Detection/Control
Operations and Maintenance
Record Keeping
Report Submissions and Reporting
Waste Identification
This type of noncompliance was not identified by respondents under the CAA.
0
1
2
3
4
5
6
7
Number of Noncompliance Events


CERCLA Noncompliance Events
Noncompliance Type
Exceedance
This type of noncompliance was not identified by respondents under CERCLA.
Monitoring/ Detection/Control
This type of noncompliance was not identified by respondents under CERCLA.
Operations and Maintenance
This type of noncompliance was not identified by respondents under CERCLA.
Record Keeping
This type of noncompliance was not identified by respondents under CERCLA.
Report Submissions and Reporting
Waste Identification
This type of noncompliance was not identified by respondents under CERCLA.
0
1
2
3
4
5
6
7
Number of Noncompliance Events


CWA Noncompliance Events
Noncompliance Type
Exceedance
Monitoring/ Detection/Control
This type of noncompliance was not identified by respondents under the CWA.
Operations and Maintenance
Record Keeping
Report Submissions and Reporting
Waste Identification
This type of noncompliance was not identified by respondents under the CWA.
0
1
2
3
4
5
6
7
Number of Noncompliance Events


EPCRA Noncompliance Events
Noncompliance Type
Exceedance
Monitoring/ Detection/Control
Operations and Maintenance
Record Keeping
Report Submissions and Reporting
Waste Identification
This type of noncompliance was not identified by respondents under EPCRA.
This type of noncompliance was not identified by respondents under EPCRA.
This type of noncompliance was not identified by respondents under EPCRA.
This type of noncompliance was not identified by respondents under EPCRA.
This type of noncompliance was not identified by respondents under EPCRA.
0 1 2 3 4 5 6 7
Number of Noncompliance Events


RCRA Noncompliance Events
Noncompliance Type
Exceedance
Monitoring/ Detection/Control
Operations and Maintenance
Record Keeping
Report Submissions and Reporting
Waste Identification
This type of noncompliance was not identified by respondents under RCRA.
0 1 2 3 4 5 6 7
Number of Noncompliance Events


TSCA Noncompliance Events
Noncompliance Type
Exceedance
Monitoring/ Detection/Control
Operations and Maintenance
Record Keeping
Report Submissions and Reporting
Waste Identification
This type of noncompliance was not identified by respondents under TSCA.
This type of noncompliance was not identified by respondents under TSCA.
This type of noncompliance was not identified by respondents under TSCA.
0 1 2 3 4 5 6 7
Number of Noncompliance Events

Resource Conservation and Recovery Act

Most noncompliance events under RCRA involved waste identification and record keeping.

The root causes most frequently identified were ***human error***, ***procedures***, and ***regulations and permits***. Specific causes associated with the root causes included:

- ***Human error:*** *individual responsibility or professional judgment*
- ***Procedures:*** *operating procedure not followed* and *management of change inadequate*
- ***Regulations and permits:*** *ambiguous federal regulations* and *inconsistent or contradictory interpretation of federal regulations*

Contributing causes included ***compliance monitoring***, ***human error***, ***procedures***, ***management***, and ***regulations and permits***.

Actions taken were primarily management or administrative in nature—that is, they involved changes in waste management procedures and plans, audits and startup reviews, training, and waste identification. One technical action that involved removal of an underground pipeline was identified.

RCRA identifies solid and hazardous waste management practices that generators of such wastes must follow. Consequently, noncompliance events under RCRA primarily involved management practices and procedures, such as waste identification unique to RCRA. Findings of the survey indicate that there is a natural connection between noncompliance events under RCRA and failure to implement required practices through ***human error*** and faulty ***procedures***. Those root causes likewise are related to one another, in that ***human error*** can lead to failures of ***procedures*** and poor ***procedures*** can create conditions under which ***human error*** is likely to occur. The complexity of RCRA regulations likely contributed to the identification of ***regulations and permits*** as the third most frequently occurring root cause category. Actions taken in response to noncompliance events for the most part were consistent with the root cause—that is, most actions focused on updating of plans and procedures and training of staff.

Clean Air Act

Noncompliance events under the CAA were distributed almost equally among operations and maintenance, monitoring/detection/control, record keeping, and reporting.

The root causes most frequently identified were ***regulations and permits***, ***human error***, and ***procedures***. Specific causes associated with the root causes included:

- ***Regulations and permits:*** *facility unaware of applicability of the regulations*
- ***Human error:*** *individual responsibility or professional judgment*; and *inexperience, lack of knowledge, lack of technical expertise*
- ***Procedures:*** *operating procedures not followed*, *record keeping procedures inadequate*, and *no written operating procedures available*

Contributing causes included ***compliance monitoring*** and ***regulations and permits***.

Almost all specific actions taken were administrative or management in nature—that is, the actions involved audits, employee training, regulatory

changes, modifications of reporting and other procedures. A few actions were technical in nature; they included:

- A performance test was conducted
- Distillation columns were brought into compliance.

One facility that had had a noncompliance event under the CAA took action by working with CMA and EPA to modify the NESHAP regulations.

The most common root and contributing causes of noncompliance under the CAA involved misinterpretation or lack of awareness of applicable regulations and permit conditions. The frequency with which this cause was identified for noncompliance events under the CAA, compared with the frequency of its identification under other statutes, suggests that both EPA and industry should consider efforts to clarify, communicate, and understand regulatory obligations under the CAA.

Comprehensive Environmental Response, Compensation, and Liability Act

The noncompliance event identified most frequently under CERCLA involved report submissions and reporting.

The root causes most frequently identified were ***human error*** and ***procedures***. Specific causes associated with the root causes included:

- ***Human error:*** *individual responsibility or professional judgment* and *inexperience, lack of knowledge, lack of technical expertise*
- ***Procedures:*** *operating procedures not followed* and *operating procedures unclear or out of date*

Contributing causes included ***human error***, ***communications difficulties***, ***compliance monitoring***, ***external circumstances***, and ***equipment problems***.

All actions taken in response to CERCLA violations were administrative or management in nature, and most pertained to reporting procedures. Only one technical action was identified—the elimination of underground pipelines containing hazardous material.

Toxic Substances Control Act

Noncompliance events under TSCA were related to report submissions and reporting, record keeping, and operations and maintenance.

The root causes most frequently identified included ***communication difficulties*** and ***regulations and permits***. Specific causes associated with the root causes included:

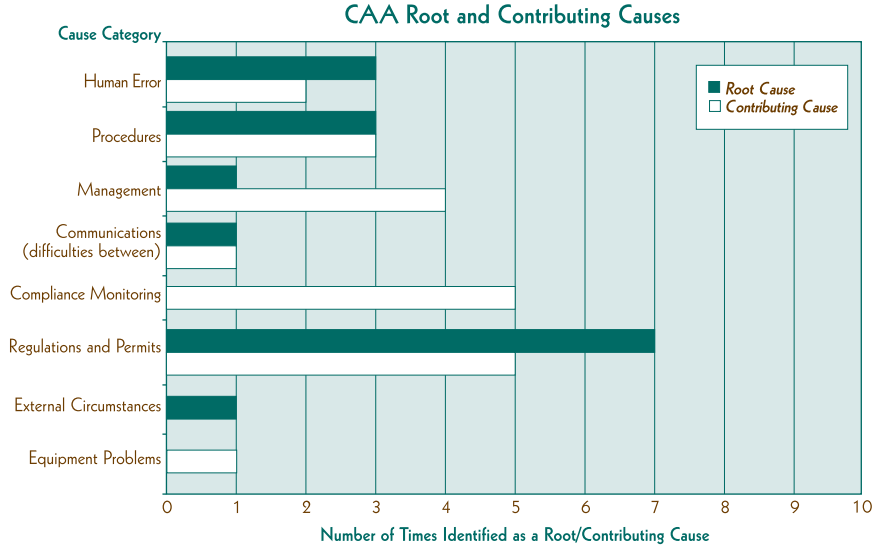
- ***Communication difficulties:*** *between employees, between facility and regulatory agencies*, and *between customers*
- ***Regulations and permits:*** *facility unaware of applicability of a regulation*

Contributing causes involved ***management*** and ***procedures***.

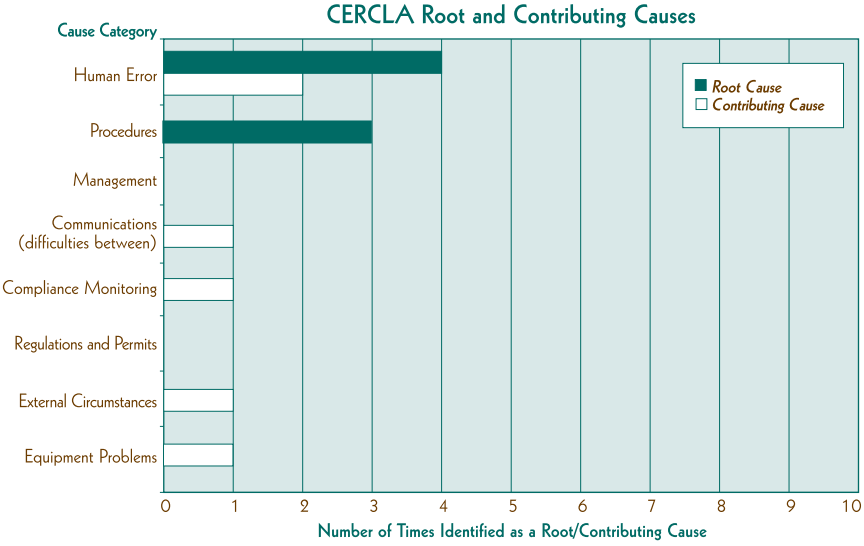
Actions taken in response to noncompliance events under TSCA were management or administrative in nature, for example:

- Reporting - sending notification of PCB activity
- Record keeping - documented all inspections performed

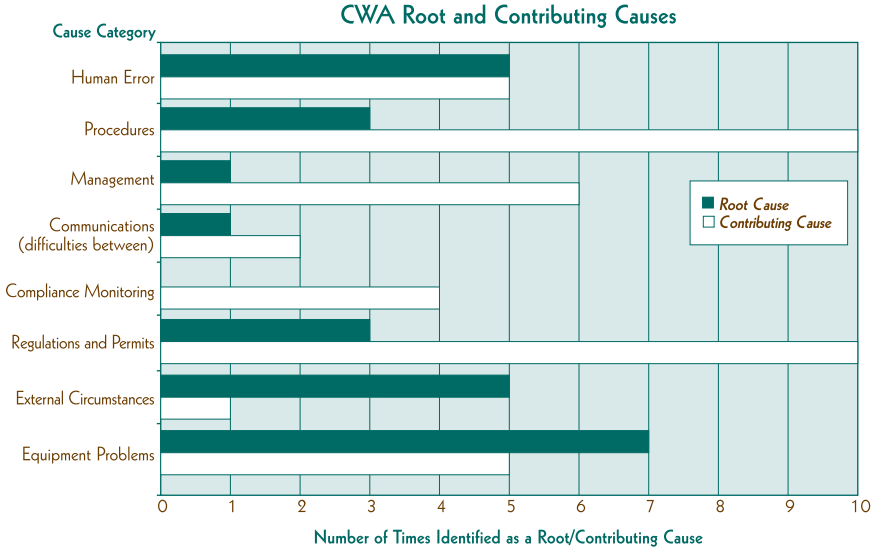
CAA Root and Contributing Causes

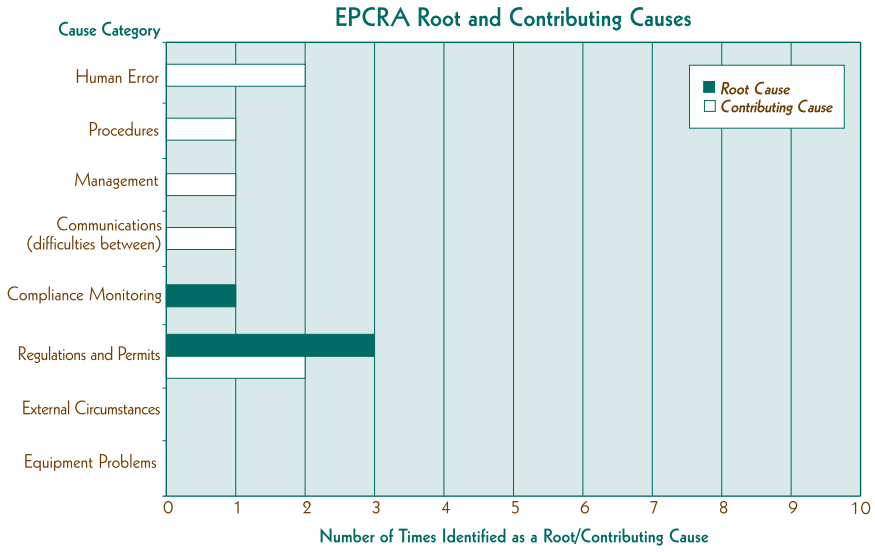


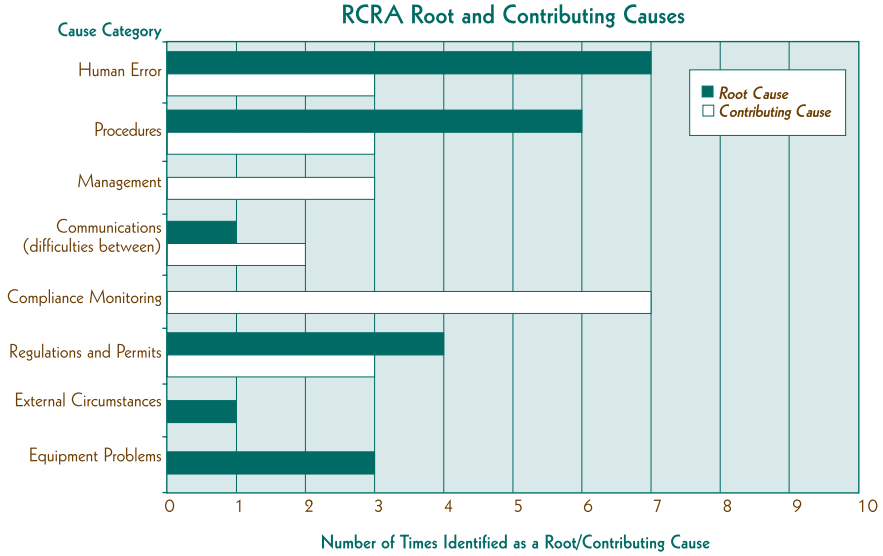
CERCLA Root and Contributing Causes

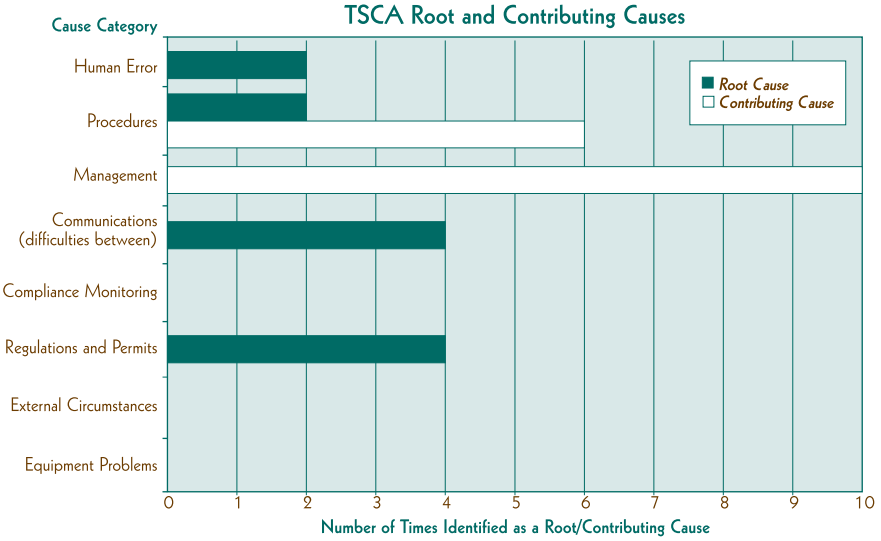


CWA Root and Contributing Causes




EPCRA Root and Contributing Causes
Cause Category
Human Error
Procedures
Management
Communications (difficulties between)
Compliance Monitoring
Regulations and Permits
External Circumstances
Equipment Problems
Root Cause
Contributing Cause
0 1 2 3 4 5 6 7 8 9 10
Number of Times Identified as a Root/Contributing Cause


RCRA Root and Contributing Causes
Cause Category
Human Error
Procedures
Management
Communications (difficulties between)
Compliance Monitoring
Regulations and Permits
External Circumstances
Equipment Problems
Root Cause
Contributing Cause
0 1 2 3 4 5 6 7 8 9 10
Number of Times Identified as a Root/Contributing Cause


TSCA Root and Contributing Causes
Cause Category
Human Error
Procedures
Management
Communications (difficulties between)
Compliance Monitoring
Regulations and Permits
External Circumstances
Equipment Problems
Root Cause
Contributing Cause
0 1 2 3 4 5 6 7 8 9 10
Number of Times Identified as a Root/Contributing Cause

- Employee training - providing training to relevant employees
- Sampling procedures - sampling all material for PCBs prior to storage so that a PCB storage facility would not be required on site

One facility that had had a reporting noncompliance event under TSCA, removed PCBs from the facility, so that it would no longer be required to report.

Most noncompliance events under TSCA involved administrative violations (labeling, record keeping, and reporting) associated with management of PCBs. Actions taken generally appeared consistent with the root causes identified—that is, actions involved employee training and clarifications of procedures. The frequency with which two contributing causes, management and procedures were identified, raises questions about the efficacy of an EMS at the facilities that had had TSCA violations. In fact, one respondent stated that an "EMS program with a TSCA portion may have prevented" the noncompliance event.

Emergency Planning and Community Right-to-Know Act

Report submissions and reporting was the sole type of noncompliance event under EPCRA identified by respondents.

The root causes most frequently identified noncompliance events under EPCRA include ***regulations and permits*** and ***compliance monitoring***. Specific causes associated with the root causes included:

- ***Regulations and permits:*** *ambiguous federal regulations*, and *inconsistent or contradictory interpretation of federal regulations*
- ***Compliance monitoring:*** *audit program insufficient*

Contributing causes included ***human error*** and ***regulations and permits***.

All actions taken involved reporting procedures. This finding is consistent with the nature of EPCRA requirements, which are reporting and administrative in nature.

Half the noncompliance events were attributed to ambiguous, inconsistent, or contradictory federal regulations or interpretations of those regulations. That finding suggests that there is great need for clarification of the EPCRA program. The natures of root and contributing causes of noncompliance events under EPCRA and of actions taken also suggest that ongoing training is necessary to help employees better understand requirements of EPCRA, so that systems and procedures can be developed to support the preparation of complete and accurate EPCRA reports.

Appendix E

Comparison of Three EMS Models

Comparison of Three EMS Models

This appendix provides a comparison of three environmental management system (EMS) models. In the descriptions, references (in parenthesis) are made to sections or criteria in each EMS model. A source from which one can obtain more information or a copy of the EMS model document also is provided.

EMS Framework Comparison			
	Responsible Care®	**ISO 14001**	**NEIC EMS Criteria**
Developer	Chemical Manufacturers Association (CMA)	International Standards Organization (ISO)	EPA National Enforcement Investigations Center (NEIC)
Description	CMA member companies are required to commit to (in writing) and implement the six codes of management practices of Responsible Care®: • Community Awareness and Emergency Response • Pollution Prevention • Process Safety • Distribution • Employee Health and Safety • Product Stewardship The integration of these codes into a management system is achieved in part through a Management Systems Verification process, which is also part of Responsible Care®. CMA members are required to implement Responsible Care® in a manner that accommodates the facilities' operating practices.	The ISO EMS standard (14001) provides an organized framework for an EMS that is based on five components: • Policy • Planning • Implementation and Operation • Checking and Corrective Action • Management Review These components are deployed through 17 key elements. The standard provides the overall structure of the EMS; however, the content and level of detail are left to the company implementing the EMS. Philosophically, the standard borrows many concepts from quality management systems, including continuous improvement through a "plan-do-check-act" cycle. While it clearly emphasizes continuous improvement, the standard does not define specific levels of environmental performance. Using the basic EMS structure, companies develop the specific details, terms, and conditions for developing and implementing an EMS.	Through numerous multimedia compliance investigations, EPA (NEIC) observed that noncompliance most often was caused by dysfunctional EMSs. Drawing on that experience, EPA developed a EMS focused on compliance to identify pertinent environmental requirements and translate them into sustainable compliance activities. The compliance-based EMS contains the following 12 elements: • Management Policies and Procedures • Organization, Personnel, and Oversight of EMS • Accountability and Responsibility • Environmental Requirements • Assessment, Prevention, and Control • Environmental Incident and Noncompliance Investigations • Environmental Training, Awareness, and Competence • Planning for Environmental Matters • Maintenance of Records and Documentation • Pollution Prevention Program • Continuing Program Evaluation and Improvement • Public Involvement and Community Outreach The guidance also provides information about how the criteria can be incorporated into a settlement document. To date, the EMS model has been included in several EPA settlement agreements when both parties have agreed that improvements in the facility's EMS were warranted.

EMS Framework Comparison			
	Responsible Care®	**ISO 14001**	**NEIC EMS Criteria**
Policy and Leadership	Guiding Principles; policy attributes are defined by the Management Systems Verification protocol (A.1 to A.7)	Environmental Policy (4.1)	Management Policies and Procedures (1)
Planning	Planning attributes are defined by the Management Systems Verification protocol (B.1 to B.7) and include: • Identifying relevant regulations and standards • Evaluating product, process, and distribution risks • Identifying employee and community concerns • Setting priorities and goals	Environmental Planning (4.2) • Environmental Aspects • Legal and Other Requirements • Objectives and Targets • Environmental Management Program(s)	Organization, Personnel, and Oversight of EMS (2) Accountability and Responsibility (3) Environmental Requirements (4) Planning for Environmental Matters (8)
Implementation, Operation, and Accountability	Implementation attributes are defined by the Management Systems Verification protocol (C.1 to C.11) and include: • Roles and responsibilities for achieving goals • Communication • Procedures • Employee training • Documentation • Pollution prevention	Implementation and Operation (4.3) • Structure and Responsibility • Training, Awareness, and Competence • Communication • EMS Documentation • Document Control • Operation Control • Emergency Preparedness and Response	Assessment, Prevention, and Control (5) Environmental Training, Awareness, and Competence (7) Maintenance of Records and Documentation (9) Pollution Prevention Program (10) Public Involvement/Community Outreach (12)
Performance Measurement and Corrective Action	Performance measurement and corrective action attributes are defined by the Management Systems Verification protocol (D.1 to D.6) and include: • Performance data tracking • Accident investigation • Record keeping • Audits • Program effectiveness measurement	Checking and Corrective Action (4.4) • Monitoring and Measurement • Nonconformance and Corrective and Preventive Action • Records • EMS Audit	Environmental Incident and Noncompliance Investigations (6)
Management Review and Reporting	Management review attributes are defined by the Management Systems Verification protocol (E.1 to E.4).	Management Review (4.5)	Continuing Program Evaluation (11)

EMS Framework Comparison			
	Responsible Care®	**ISO 14001**	**NEIC EMS Criteria**
Source of More Information	CMA's Responsible Care® department is a valuable resource for CMA's members and partners. Those seeking more detailed information about Responsible Care® or the Partner Program should call (703) 741-5303. Those companies that may not be interested in CMA membership or participation in the Partner Program, but that find themselves struggling and needing assistance in implementing an EMS, should contact their state chemical industry council.	In October, 1997, EPA published the ISO 14000 Resource Directory (EPA/625/R-97/003). The goal of the document is to inform readers about the ISO 14000 standards and activities. The document can be accessed through: *<http://www.epa.gov/ttbnrmrl/625/R-97/003.htm>*	The NEIC guidance document, Compliance-Focused Environmental Management System-Enforcement Agreement Guidance (EPA 330/9-97-002) can be accessed through: *<http://es.epa.gov/oeca/oceft/neic/pubstxt.html>*

Appendix F

Respondent Recommendations Related to Specific Statutes

Respondent Recommendations Related to Specific Statutes

Respondents to the Root Cause Analysis Pilot Project survey offered many recommendations related to specific statutes. These recommendations were categorized in four categories: compliance assistance recommendations, changes in EPA policy, regulatory changes, and statutory changes. The recommendations are identified by statute in the following tables. No recommendations related to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) were provided.

Clean Air Act

Individual respondents suggested that EPA implement the following initiatives under the Clean Air Act (CAA).

Compliance Assistance Recommendations —

New Source Performance Standards (NSPS) rules:

- Publish notices in the Federal Register that provide reminders of compliance deadlines
- Provide reminders of deadlines under specific rules through list serves on the Internet

National Emission Standard for Hazardous Air Pollutants (NESHAP)—for vinyl chloride

- Exclude releases to flares from reporting requirements

Allow reduced frequency of monitoring in light of a facility's leak history (40 Code of Federal Regulations [CFR] part 63 subpart F)

Changes in EPA Policy —

Make the 1992 "draft" control technique guidelines for industrial wastewater systems final

NSPS rules:

- Allow enforcement discretion for facilities that meet the intent of the regulations and rules, but do not meet the prescriptive record keeping and reporting requirements
- Extend the time allowed to come into compliance with new rules

Regulatory Changes —

Consolidate fugitive emissions rules into one set of requirements

NSPS rules:

- Extend the compliance date for existing rules

NESHAP for asbestos:

- Regulate waste manifest requirements under the Resource Conservation and Recovery Act (RCRA) or state solid waste rules, rather than under the CAA

Allow reduced frequency of monitoring under the Hazardous Organic NESHAP in light of a facility's leak history (40 CFR part 63 subpart F)

Statutory Changes —

NSPS rules:

- Modify the effective date for new sources, making it the date the rule actually becomes final

Implement a 10-year moratorium on all new CAA rules so facilities can achieve compliance with existing rules

Clean Water Act

Individual respondents suggested that EPA implement the following initiatives under the Clean Water Act (CWA).

Regulatory Changes —

Allow the use of chemical oxygen demand (COD) to screen for compliance with the requirements governing biochemical oxygen demand (BOD)

Emergency Planning and Community Right-to-Know Act

Individual respondents suggested that EPA implement the following initiatives under the Emergency Planning and Community Right-to-Know Act (EPCRA).

Compliance Assistance Recommendations —

Clarify the instructions and guidance for completing Form R

Provide better outreach on instructions for completing Form R

Changes in EPA Policy —

Provide revised reporting forms to industry well in advance of compliance deadlines

Change the instructions for Form R to indicate that transitory, nonisolated intermediates are not "manufactured" and therefore such materials should not be subject to threshold determinations for Form R reporting

Regulatory Changes —

Raise reportable quantities for reporting of releases

Address the applicability of reporting requirements to transitory nonisolated intermediates through rule making

Simplify the rules for completing Form R

Statutory Changes —

Develop a more reasonable small source exemption

Resource Conservation and Recovery Act

Individual respondents suggested that EPA implement the following initiatives under the Resource Conservation and Recovery Act (RCRA).

Compliance Assistance Recommendations —

Develop plain-language guidance for compiling all requirements pertaining to satellite accumulation

Develop a subpart CC self-audit check list

Develop plain-language guidance for the boiler and industrial furnace (BIF) rule

Regulatory Changes —

Relax monitoring requirements for BIFs

Revise 40 CFR section 264/65.193 (e)(1)(iii), containment and detection of releases, to consist entirely of a performance standard

Eliminate in-process materials from the definition of solid waste

Allow as many as 55 gallons of each waste code in satellite accumulation areas

Toxic Substances Control Act

Individual respondents suggested that the EPA implement the following initiatives under the Toxic Substances Control Act (TSCA).

Regulatory Changes —

Narrow the scope of reporting requirements under section 8(e)

Statutory Changes —

Eliminate reporting for exports that contain chemicals listed in section 12(b)